



FRIDAY, MAY 11, 1894.

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## Contributions.

The office of the Railroad Gazette is now at 32 PARK PLACE, New York.

## Chicago Time Signals.

Branch Hydrographic Office, CHICAGO, April 24, 1894.

TO THE EDITOR OF THE RAILROAD GAZETTE:

As inquiries at this office show that the Time Signals are not fully understood, will you kindly notify lake navigators and transportation companies, through your columns, that the U. S. Naval Time Ball is dropped from the top of a flagstaff on the dome of the Masonic Temple, corner of State and Randolph streets, Chicago; by the electric transmitting clock of the Chicago Branch Hydrographic Office, situated on the 16th floor of the same building?

The time ball is hoisted to the top of the staff, 350 feet above the level of the lake, five minutes before noon (11.55 A. M.) central standard time, every day, Sundays excepted; remains at the mast-head five minutes, and is dropped by electricity exactly at the instant of noon. Should any accident occur by which the time ball is dropped before the exact instant of noon, it will be hoisted again immediately and left up until five minutes after noon (12.05 P. M.); and then be slowly lowered, instead of being dropped. In case the time ball should fail to drop exactly at the proper instant, it will be kept up until five minutes after noon (12.05 P. M.), and then slowly lowered as before. The exact instant that the time ball starts to drop from the mast-head, is the time of noon. Lowering the time ball slowly, indicates that it is five minutes after noon, and that the signal current, sent by the transmitting clock, has, through some accident, failed to operate the electric detaching apparatus at the instant of noon.

The Chicago Branch Hydrographic office is designed to collect and distribute information gratuitously. It was established by the United States Navy Department for the free use of the public throughout the basin of the Great Lakes, and is supplied with a complete set of charts and sailing directions covering every part of the known world. All persons interested in lake navigation are invited to visit the Branch Hydrographic Office, where they can obtain all the latest information relating to the navigation of the lakes, as well as similar data for all the navigable waters of the globe; weather conditions, reports of ice, reports of currents, recent chart corrections, etc. The office is supplied with a complete set of nautical, meteorological and electric time instruments; and also with books, papers and pamphlets on nautical matters; including the use of oil for the preservation of life and property in storms at sea, the instructions of the Life Saving Service, lists of light houses, beacons and buoys, etc., which may be consulted and examined freely. It is intended to establish a similar Branch Hydrographic Office, with time ball, at Cleveland at an early date.

GEO. P. BLOW,  
Lieutenant U. S. Navy.

## Underground Railroads in London.

LONDON, April 20, 1894.

TO THE EDITOR OF THE RAILROAD GAZETTE:

The prospectus has now been issued for the Charing Cross, Euston & Hampstead Railway, an undertaking about five miles in length for which \$7,000,000 of share capital is being issued. In addition there is also a sum of about two and one-third million dollars allowed by the special act to be borrowed.

The route selected is from Charing Cross in the Strand, King William street (not the King William street by London Bridge near which the City & South London electric railroad terminates, thence under Charing Cross Road, Tottenham Court and Hampstead Roads and Haverstock Hill to the High street at Hampstead, with a branch along Drummond street to the front of Euston Station.

The Greathead system is to be adopted, with two tubes as in the South London Railway; but though the customary phrases such as "vast resident population," "ever increasing needs," and others similar are plentifully strewn over the face of the prospectus, there is not a single scrap of information afforded as to the size of the tunnels, the gauge of the rails or the depth below the surface. This is in fact merely an independent scheme, to which there appears to have been given not the slightest thought or consideration in respect of a possible future connecting with a general scheme for London.

Promoters of railroads in London have not in the past distinguished themselves by judgment in the selection of either routes or locality, and the results to-day are serious enough, one would suppose, to prevent the irresponsible promoter from playing havoc with the only remaining locality for further lines of transport.

It is intended, vaguely says the prospectus, to run a two and one-half minutes' service of trains, having a seating capacity of 200, but it is claimed that 75 passengers per train at an average fare of three and one-half cents, will provide about \$775,000 annually, or sufficient to pay 9 per cent. on the ordinary shares. It is to be observed that the working expenses are set down at only 32 per cent. and the prospectus has the impudence to say that this is based upon the actual experience of other railroads. It looks very much as if the man who drew up this prospectus had wilfully or ignorantly transposed the percentages of working expenses and surplus. Were this so, the apparent margin of 6 per cent. would be reduced to about 2 per cent.

Decidedly I should say the route chosen is better than that of the South London line, but a capitalization of nearly \$3,000,000 per mile of double tunnel with a minimum of excavation in a dry clay, does seem rather heavy. No engineering difficulties are anticipated and water there is none in the London clay to speak of, while the deep water level under London, thanks to the large amount of pumping from numerous artesian wells, lies practically down to the upper surface of the chalk, which is 80 to 100 feet below the basement bed of the London clay.

ENGINEER.

## Need of Better Inspection in the Operating Department.

TO THE EDITOR OF THE RAILROAD GAZETTE:

The usual penalty for a serious violation of rules on railroads in this country is a dismissal from service; lesser infractions are generally punished by suspending the offender for seven, fourteen or thirty days. The rules and regulations governing the running of trains on a railroad are laws, and should be so considered, and it often occurs that the disgrace and injury occasioned by a strict enforcement of a sentence, does more to destroy the reputation of the guilty person than anything else could do. Railroad officers who hire and discipline and discharge employees cannot be too careful in exercising their authority. The decision should be made impartially, giving the accused the benefit of the doubt. Accidents have happened on railroads, and are likely to happen as long as railroads are operated. In order to make a lesson to all train men, what is best to be done? A good man who has made some little mistake is less likely to do so again than one who has never tried the responsibilities of running trains. On many railroads there is a lack of confidence between the men and the officials immediately over them.

At the present time the auditing department gives the most clear, direct and valuable information to its subordinates, and why? Because, if the general instructions are not respected, through ignorance or misunderstanding, special agents are sent out, and the erroneous impressions righted. Why should not the superintendent do this? Let him take a man of good character who has been promoted from the lowest position until he has charge of a train, familiar with all the branches which he has passed through, and appoint him special agent to go among the train men and see if they understand the different rules, orders and special instructions. If misconstructions are discovered, instruct them. The men will become more interested in their work and feel at liberty to modestly offer suggestions that would be of intrinsic value to the road. Many men would feel more at liberty to confide to the special agent any doubtful feeling concerning rules or general orders than they would to superintendents or train masters.

Every wreck, every accident, every mistake has its lesson; sorrow has gone to the homes of passengers and losses to the railroad company, on account of men misconstruing rules after the company has expended thousands of dollars for safeguards. It has been the policy of railroad managers to bring their equipment and appliances up to the highest standard of efficiency to afford to passengers and property all the protection attainable, but do they know beyond a doubt that their men have a clear and practical knowledge of all matters relative to the discharge of their duties? The newly promoted man who goes before his superintendent for examination, and recites his book of rules without a mistake, is not always the safest man. To settle that point the practical aspect of each and every rule must be brought out, and the man's sense of moral and legal responsibility must be tested.

C. D. L.

## The Use of the Telephone on French Railroads.\*

The value of the telephone in railroad service has been recognized ever since its invention by A. Graham Bell, in

\* Abstract of a paper by G. Dumont in the *Memoirs of the French Society of Civil Engineers*, March, 1893.

1876, but it has been largely adopted by the railroads only during the last few years. Its use is now rapidly becoming general.

Two classes of apparatus are common, the magnetic and the micro-telephone. The former, as devised by Bell, is marvelously simple, but it admits of distinct conversation for a short distance only. By combining it with the Hughes microphone we have the micro-telephone, which, though more complicated, is incomparably more powerful. Except on roads with limited traffic and stations very close to each other, it is the only serviceable telephone for railroads. Its principal inconvenience is the necessity of using batteries, while the Bell telephone, on which the calls are made by magneto bells, do not need this accessory. Endeavors to modify the latter so as to render it more powerful have failed, so far, but the researches have served to develop a very perfect instrument. Thus the magnetic telephones of the French General Society of Telephones weigh only 10 ounces, and with an aluminum casing only 4 ounces. These telephones serve as receivers for the micro-telephone stations.

Experiments in France have shown that with the Ader micro-telephone and Leclanche batteries it is possible to telephone over No. 9 iron wire, with ground return 87 miles and one could understand incoherently 103 miles. Repeated trials show that with standard current, over iron telegraph wire with ground return an assured telephonic communication is not practical beyond 15 to 20 miles on telephones which are not placed in closets, but are located in naturally noisy places like the offices in stations. This is due to the excessive electrostatic capacity of iron; its great self-induction; the use of the earth as return; the induction of the telegraph wires adjoining, and other causes. The last-named cause is very important, and the Ryssel-berge anti-inductor system in Belgium and that of Gwozdeff in Russia partly succeed in eliminating it. The former, with which one can telephone and telegraph simultaneously over one wire of silicon bronze or galvanized steel or iron, is largely used in Belgium. With the system Gwozdeff it was possible to telephone 183 miles over an iron conductor while the telegraph apparatus was in continuous use. The French railroads have preferred to establish special telephone lines with copper wires of high conductivity. But as these wires are strung from the same poles as the telegraph wires and are consequently quite close to them, it becomes necessary to avoid the effects of induction. This is accomplished in a simple manner by using two No. 15 bronze conductors which cross each other about every 1,640 feet. This will neutralize induction. With the bronze wire spans of 300 up to 390 feet are admissible.

*Use of Telephones on Trunk Lines.*—In France communication with subscribers of city telephone systems is limited as the high tax on instruments compels the companies to restrict the number of installations. But for communication in the yards the telephone is used to connect the superintendent with the freight offices, switch towers, shops, etc. In certain yards even orders are given except such as affect the safety of trains. Important messages are written down in a special book and are compared by repeating.

Some companies think of replacing the telegraph by telephone even for the transmission of important orders. There are some railroads with light traffic where the telephone is already thus used, but the entire substitution of the telephone would be difficult. The single iron conductors used for the telegraph would not be suitable and it would be necessary to establish special telephone lines with double wire. On the Vincennes Railroad in the stations between Paris-Bastille and La Varenne, which are at distances of about one mile, at a signal by telegraph the telephone wires are connected with the telephone instruments and are thus made available for an extended telephonic intercourse. The arrangement gives excellent results. The Northern Railroad of France has established on trial telephone stations on the open road along some of its main lines, through which assistance can be summoned from the stations in case of accident. The stations are equipped with telephone receivers. Portable telephone instruments are in use on some small French roads. The large Austrian railroads use field telephone instruments of the Gattinger system, which in a few minutes can be connected with the telegraph wires at any point, their use not interrupting the telegraphic communication. Under favorable conditions conversation is possible at distances up to 31 miles.

In England telephone connection between block signal stations is common. On the seven large French railroads there were in use in January, 1893, about 1,210 telephones against 5,200 telegraph stations.

*Secondary Railroads.*—It is now conceded that on secondary railroads the telephone may completely replace the telegraph. For these roads, where traffic is light and whose stations are often platforms only, an apparatus was needed simpler and more expeditious than the telegraph. The telephone has been used for the complete operation of secondary roads in Belgium. There are no buildings at the stopping places, and the telephones are placed in a locked box in a room of a neighboring tavern. Each station has microphone, two receivers and a magneto-electric call-apparatus. All stations of a road are on the same circuit. Conversation has been held between the end stations of a line 36 miles long and having 18 stations. At first No. 9 iron wires were used, but now No. 15 phosphor bronze wires of 30 per cent. conductivity are preferred. The total number of telephone stations on the Belgian secondary roads is 197, on an average 2.1 miles apart.

The total length of roads is 675 miles, of which 170

miles have iron and the rest bronze wires. In the narrow gage roads of the river Maass, which comprise 96 miles, the telephone is used almost exclusively.

#### The Bellefontaine Shops of C. C. & St. L. Ry.

The limited capacity of the Cleveland shops of the Cleveland, Cincinnati, Chicago & St. Louis, and the difficulties attending their extension, rendered it necessary to construct a larger plant on a larger and more convenient site. Bellefontaine, O., was selected on account of its natural advantages, and because of it being an intermediate point between two great cities.

is provided with the necessary columns and supports for an electric traveling crane of sufficient capacity to lift the heaviest locomotive. The transfer table will be driven by an electric motor with additional apparatus for pulling engines in and out of shop. Until the electric plant is installed the table will be operated by hand. The scheme appended shows, by reference letters, the positions of the tools.

Nearly all the machine tools are new, from the Pond Machine Tool Co., the Niles Tool Works, Lodge & Davis, and others. In the center of shop is the tool room in which are all tool-making machines. The check system

is provided at night by an independent automatic engine and during working hours by a belt from a pulley on the main line shaft. The heater uses either exhaust steam from the Corliss engine or live steam from the boilers. It is probable that the heat derived from the exhaust steam will be sufficient to heat the shops, except in zero weather; then live steam will be turned on.

Fire protection is provided by fire hydrants and hose reels about the shops.

The blacksmith shop is 75x219 ft. It is equipped with 20 double forges marked x on the plan, a 4,000 lb. steam hammer made by the Morgan Engineering Co., a heavy bar-iron shear and a steel pressure-blower. The shop is kept free from smoke by a 100-in. duplex steel exhaust fan. Over each fire is a sheet iron hood. This is connected to a 17-in. pipe leading to a large main pipe which is connected to the exhaust fan. The smoke is exhausted from the hoods and blown out through a pipe in the roof.

The tank and copper shop is 62x138 ft., with four tracks and capacity for eight tenders. At one end of this building are the Master Mechanic's office and store room for supplies.

The round house has 17 stalls and is heated by steam from boilers in an annex. Two stalls are provided with a drop pit for removing wheels. The smoke jacks have a drop hood. The oil room is 21x36 ft. and contains nine oil tanks fitted up in most approved manner. The coal chutes contain 20 pockets holding five tons each, and at one end the sand house is located. The dry sand is elevated to a store room; from there it is conveyed to locomotive sand boxes by a sheet iron pipe.

From the description and engravings it will be seen that a great deal of care has been given to the design of these shops, and the construction and location as pointed out are well worth considering by others who contemplate like changes.

#### The Efficiency of Air and Foundation Brakes.

Mr. W. H. Marshall presented at the April meeting of the Western Railway Club, a paper with the above title of which we give a short abstract.

The author first refers to errors in the design and application of foundation brakes more commonly found in freight equipment. Among such errors noted are: the location of brake cylinders, reservoirs, and triples and drain-cups without reference to their accessibility when cleaning, oiling or making repairs, incorrect leverages, the use of unnecessarily short levers, and insufficient support for pipes and other parts.

The investigations made referred more particularly, however, to the determination of such losses as cause the actual brake shoe pressure on the wheels to fall below what should be derived from a pressure of 70 lbs. in the reservoirs, transmitted to the shoes by a frictionless brake gear of the proper leverage. These losses are classified as follows:

Inufficient train pipe and reservoir pressure.

Excessive piston travel.

The friction of piston packing.

Piston release spring resistance.

Tension of brake beam release springs.

Friction in foundation brakes.

Inufficient leverage.

Brake shoes not applied to all wheels.

The positions of shoes and angle of break beam hangers.

Coefficient of friction of the brake shoe metal.

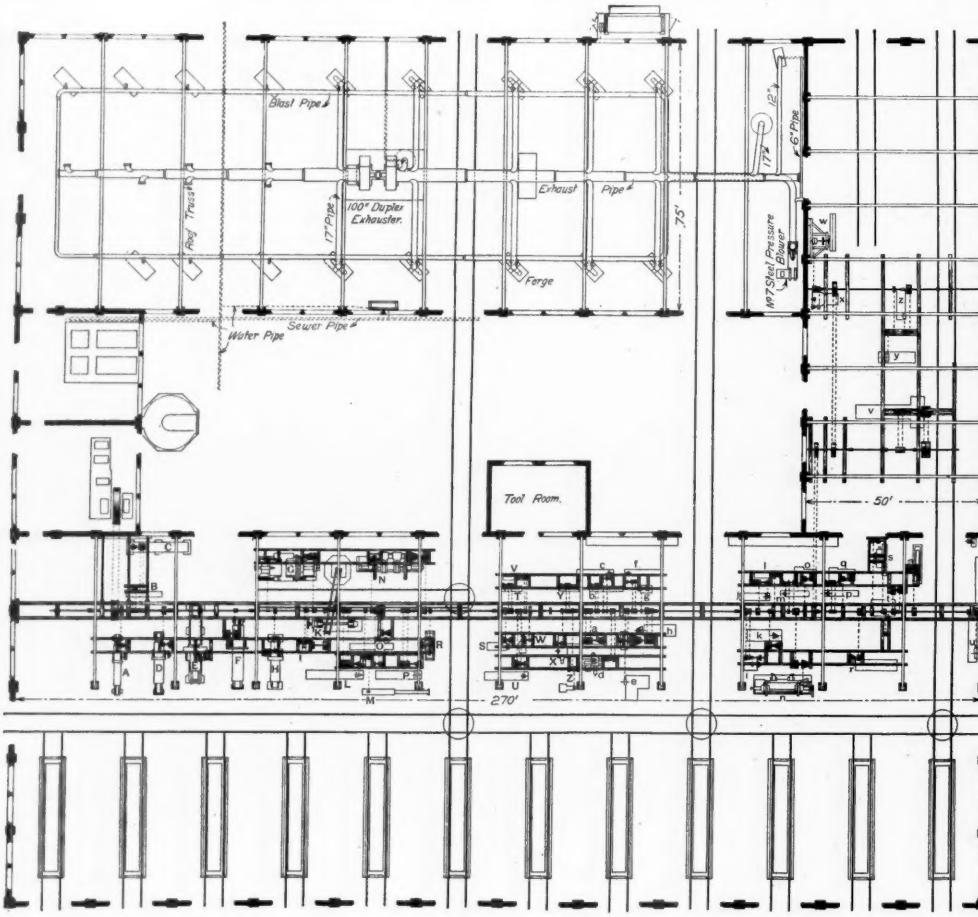
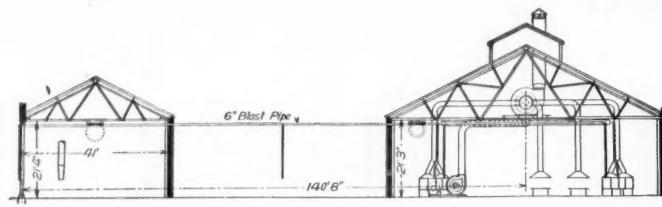
A tabulation of the standard train pipe pressures on roads aggregating about one-half the total mileage of the country shows that several are using more than 70 lbs. A few of the roads in mountainous country are using 75 lbs. and one or two roads use as high as 90 lbs. The number using a pressure lower than 70 lbs. is small.

A table is given showing the pressure resulting from piston travels from 3/4 in. to 12 in. in both passenger and freight equipment, and with four different reservoir pressures. With 70 lbs. reservoir pressure, and an emergency application, the cylinder pressure with four in. piston travel, is 64 1/2 lbs. in passenger, and 64 lbs. in freight, or an increase of 7.5 per cent. and 6.7 per cent. respectively, over the regulation 60 lbs., while with 12 in. travel the pressure became 56 lbs., 6.7 per cent less, than it should be. With a piston travel of 4 in., a 5 lbs. reduction (with 70 lbs. in the reservoir) gives an average 27 lbs. in the cylinder, while at 8 in. travel, it has fallen to almost nothing. The figures for the 10 lbs. service reduction are as striking as the 5 lb., particularly when we remember that the 10 lbs. at 12 in. is almost wholly consumed by the great compression of the cylinder release spring.

Experiments made at the South Kaukanna shops of the Chicago & Northwestern showed a loss of from 5 to 14 per cent. due to the friction of piston packing. Similar tests at the Western avenue shops of the Chicago, Burlington & Quincy showed a variation of from 9 to 12.3 per cent. loss with an average of about 9 1/2 per cent., the piston travel being 7 in. and the strength of the release spring assumed to be the same as that of others tested. These experiments were made by placing an oil cylinder with frictionless piston in front of the air brake cylinder after removing the cylinder lever and determining the loss by placing gauges on each cylinder. The figures do not, however, agree with the results obtained by the Westinghouse Air Brake Company, which reports a loss of but 1 per cent. due to this cause. Mr. Marshall believes that the loss due to leakage of air past the piston is very small.

The variation of the tension of cylinder release springs at different travels of the piston was quite uniform, ranging for a 10 in. passenger piston with 70 lbs. train pipe pressure, from 4.1 to 7.7 per cent., the piston travel in the first case being 4 in. and 11 in. in the last. For a 14 in. passenger cylinder the figures are 4.4 per cent. and 9.6 per cent. respectively; and for an 8 in. freight cylinder they are 6.5 per cent. and 11.7 per cent. respectively.

The use of brake beam release springs is considered by the writer to be one of the least excusable, yet one of the most fruitful causes of loss of power in passenger brake equipments. If brakes are properly hung the shoes will fall away from the wheels by gravity; no one dreams of using release springs on freight trucks, and there is no more call for them in the one class of service than in the other. It is generally supposed that they do valuable service in keeping the shoes from the wheels, but if there is any inequality in the strength of springs on the same car, the result is the reverse of that desired—the slack is



Bellefontaine Shops of the Cleveland, Cincinnati, Chicago & St. Louis Railway.

A—30-in. planer  
B—No. 15 lathe  
C—No. 29 lathe  
D—36-in. planer  
E—No. 30 planer  
F—No. 10 planer  
G—No. 26 wheel lathe  
H—No. 22 planer  
I—Pipe cutter  
K—No. 25 hydraulic press  
L—36-in. lathe  
M—Flue cutter

N—No. 24 wheel lathe  
O—Rod milling machine  
P—30-in. lathe  
R—Large grindstone  
S—10-in. slotted  
T—18-in. turret lathe  
U—No. 27 lathe  
V—No. 9 lathe  
W—Large emery wheel  
X—No. 5 sharpener  
Y—No. 18 turret lathe  
Z—No. 3 drill press

a—30-in. lathe  
b—No. 17 lathe  
c—No. 28 lathe  
d—No. 14 slotted  
e—No. 1/2 radial drill press  
f—No. 16 lathe  
g—No. 34 centering machine  
h—No. 20 slotted  
i—37-in. boring mill  
j—No. 7 bolt and nut machine  
k—60-in. horiz. boring mill  
l—6-spindle nut tapper

m—No. 32 lathe  
n—No. 23 car wheel lathe  
o—Double head bolt cutter  
p—No. 19 lathe  
q—Stay bolt cutter  
r—Double axle lathe  
s—Guide grinder  
t—Car wheel borer  
u—48-in. wheel press  
v—Bending rolls  
w—Boiler plate shears  
x—No. 8 drill press

ate point between Cleveland, O., and Indianapolis, Ind., a proper place for the terminus of two sub-divisions. It is also on the Sandusky division, thus making the shops convenient for handling heavy repairs for three divisions.

The plant is situated on a strip of ground parallel to the main track half a mile from the station and adjacent to the freight yards.

The shops are built on the sides of a rectangle, with an open court between, as shown in the engraving. They are constructed of brick with stone trimmings and foundations, and comprise a 17-stall round house, erecting and machine shop, boiler shop, blacksmith shop, tank and copper shop. The shop roof trusses are of angle iron construction and covered with slate, with large skylights. The subject of light has received careful consideration, and the factory plan was adopted of putting in as many windows as possible. The space between windows is as small as consistent with security.

The erecting and machine shop, shown in the illustration, is 100x270 ft. In one-half are the machine tools and the other half contains twelve tracks with a capacity for eleven engines. Each track contains a pit with bottom raised in the centre, running the entire length of the engine. At intervals along the tracks are drop pipes to supply the necessary air from blacksmith shop fan, for supplying portable forges for heating rivets and other parts. Each pit is provided with hose connection to water mains for filling boilers, and a standard gauge track runs through the shop. Heavy machine tools are located near this track and suitable trucks carry material to and from machines. The shop

is used, each man giving a numbered check for each tool taken from the room. The foreman's office is also here.

Power to drive the machinery is derived from a 180 H. P. Bates Corliss engine, situated in an annex to machine shop. It has 16x42 in. cylinder, 10 ft. band wheel and is run at 60 revolutions per minute. The boiler pressure is 80 lbs., and cut-off at one-fifth stroke. The power can be largely increased by increasing the speed of the engine and the pressure to meet future demands.

The boiler shop is 50x136 ft. and is equipped with modern punching and shearing machines, power rolls, etc. The track will hold four boilers.

Steam for the engine and heating system is supplied by two boilers 60 in. diameter by 16 ft. long. Space has been left for a third boiler, should the plant require it. A sheet iron pipe 40 in. in diameter connects the boilers with a brick chimney 120 ft. high, substantially built and equipped with a neat iron ladder running to the top. Water for the boilers is derived from two sources: from the city water main through an injector, and from a well receiving the condensed water from the heating apparatus. Water of condensation is forced into the boilers by a duplex pump.

Sturtevant steam hot blast apparatus furnishes the heat for the machine, boiler and blacksmith shops. The round house, tank and copper shops are heated by steam from boilers located in the annex to the round house. The hot blast apparatus is at the end of the machine shop, on a raised platform; galvanized iron pipes distribute heat to the various shops. The steel plate fan used with the heat-

found at the shoes adjacent to the strongest springs, while at the other places the shoes are touching the wheels. The tension of the brake beam release springs tested by Mr. Marshall with shoes half worn, varied from 400 to 2,640 lbs. per car. He believes that "they should be abolished entirely in all new work and on those cars already built whose brakes hang or can be hung so that gravity will cause the shoes to leave the wheels. When they must be retained on cars already built, their tension should be made as low as possible, and care taken to see that it remains so."

To determine the friction in foundation brakes, an oil cylinder was fitted to the brake beam of a car in such a manner that its piston transmitted all the pressure of the lever to the brake beam, the pressure in the cylinder being recorded on a gauge inside the car. Another gauge placed beside the first was connected with the air cylinder. The total friction was thus obtained, and deducting the amounts already obtained for losses of the cylinder release spring, the piston packing friction and the brake beam release spring, the friction of the foundation brakes was found to vary while standing, from about 17 per cent. with a brake pressure cylinder of 15 lbs., to about 13 per cent. with 50 lbs. brake cylinder pressure. A running test on the same car with a piston travel of eight in., seemed to show that at low pressure the friction of the foundation brake was practically eliminated by the vibration, while at high pressures the loss due to this cause ran as high as 8 per cent. Similar results were obtained with the same apparatus on the Chicago, Burlington & Quincy. No tests were made in freight service.

izing bar between the two pairs of driving wheels, but each pair is equalized with the adjacent pair of 54 in. wheels. The principal dimensions of the engine are:

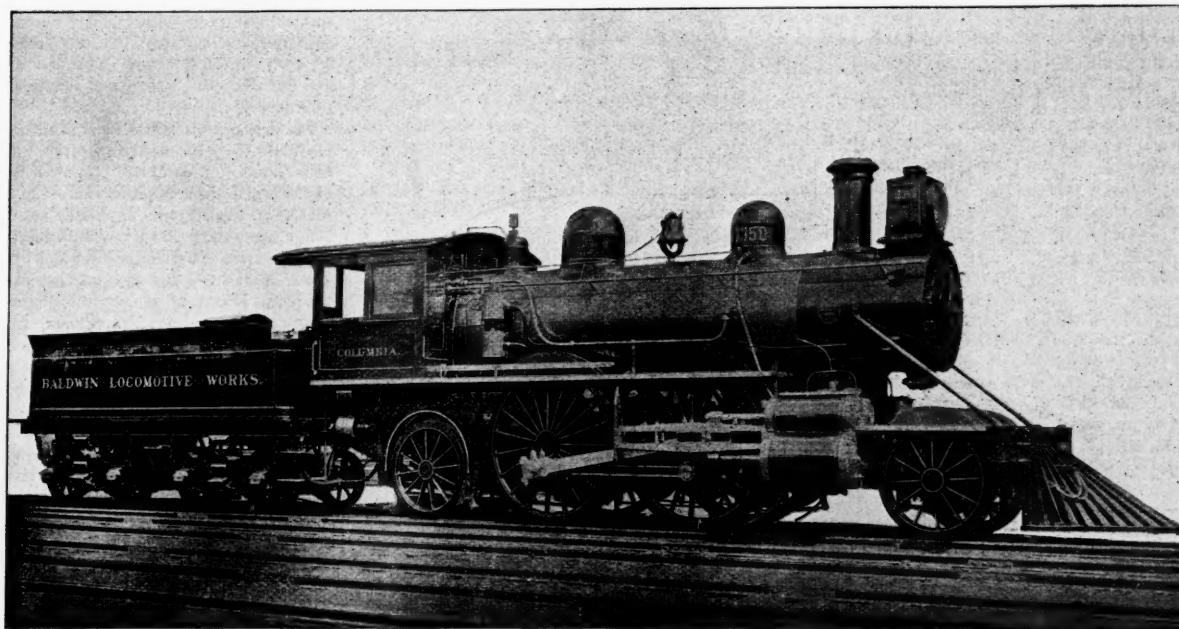
Cylinders . . . . .	13 and 22x26 in.
Weight on drivers . . . . .	83,140 lbs.
Weight on truck wheels . . . . .	43,500 lbs.
Weight, total . . . . .	126,640 lbs.
Wheel base, engine . . . . .	24 ft. 7 in.
Wheel base, driving . . . . .	7 ft. 4 in.
Boiler, diameter . . . . .	54 $\frac{1}{4}$ in.
Height of stack . . . . .	14 ft. 4 $\frac{1}{2}$ in.
Heating surface, firebox . . . . .	128.23 sq. ft.
Heating surface, tubes . . . . .	1,349.90 sq. ft.
Heating surface, total . . . . .	1,478.13 sq. ft.
Grate surface . . . . .	24.77 sq. ft.
Driving wheels, diameter . . . . .	84 $\frac{1}{4}$ in.
Engine truck wheels, diam. . . . .	54 $\frac{1}{4}$ in.
Tender truck wheels, diameter . . . . .	36 $\frac{1}{2}$ in.

From a special report made by Mr. S. M. Vauclain we gather the following data concerning these trips:

The trains hauled were Nos. 503 southward and 510 northward, most of the time. The schedule time of these trains between Philadelphia and Canton (the eastern terminus of the Baltimore ferry), 91.6 miles, is 2 hours northward and 2 hours, 2 min. southward, with three regular station stops each way. They generally have five or six cars, though in some cases eight or nine were hauled.

The grade from Canton to Philadelphia is quite irregular. From the starting point to the Susquehanna River

The train left Washington at 8.04 a. m. and ran to Baltimore, 40 miles, in 41 minutes. Slight delays occurred at the ferry and the train left Canton at 9.20, 10 minutes late. Extra stops had to be made at Van Bibber, 20 miles from Canton, at the foot of a heavy grade, and Susquehanna Bridge, 34 miles, was reached 12 minutes late. Newark, 54 miles, was left 8 minutes late. An extra stop had to be made near Wilmington, losing five minutes, and soon after leaving Wilmington a passenger had to be let off who had got on the wrong train. Philadelphia was reached 6 minutes late and there were delays at the Reading Terminal for inspection of train and other things, and the train started from the latter point at 11.44, 13 minutes late. Stops were made at Spring Garden street, Columbia avenue, Wayne Junction and Jenkintown; and Trenton Junction was reached 6 minutes late. There was a delay of two minutes here. Bound Brook was reached 4 minutes late. Extra stops were made at Plainfield and Elizabeth, and there was a delay of 3 minutes for the drawbridge at Newark Bay, but the train reached Jersey City at 1.44 p. m., which was so near the schedule (1.43) that it was recorded on time. There was not a pound of fuel left in the tender. The engine was taken to the roundhouse and found in good order and the fire was drawn. There was a very small quantity of cinders in the smoke-box.



Vauclain Four-Cylinder Compound Express Locomotive, "Columbia."

Built by the BALDWIN LOCOMOTIVE WORKS, Philadelphia.

Insufficient leverage arises from one of two causes, either the adoption of low standards of brake power, or mistakes in putting up foundation brakes. But many purposely lower the brake power by adopting something less than 90 per cent. of the weight as their standard. There is certainly no excuse for anything less than 90 per cent.

In freight service the accepted practice is to brake 70 per cent. of the light weight of the car. I believe this to be wrong, and that 90 per cent. of the light weight should be braked as in passenger equipment. That it can be done is clear from the fact that a number of roads are successfully using that percentage without slide flat wheels. And in view of the difficulty of controlling heavily loaded freight trains, and the small brake available at best, there is no good reason why advantage should not be taken of the additional 50.

Of the 5,302 12-wheeled cars reported in the table, only 2,385 are braked on all wheels, and of those nearly 1,600 can be credited to sleeping car companies. It is evident, therefore, that the railroads, taken as a whole, have done but little in this direction to improve the brake service. One reason for this is that it is impossible to get brakes on the middle wheels of some six-wheeled trucks, but it must be admitted that there is not sufficient energy shown in this direction.

There is but little to be said on the position of shoes and angle of brake beam hangers, for the reason that the practice of to-day is reasonably correct in this respect. It should be borne in mind, however, that in exaggerated cases the angle of the hanger may play an important part, either causing a considerable loss, or such an increase as to slide the wheels, and that if when the brakes are on, the hanger is parallel to a tangent to the wheel at the middle point of the brake shoe contact, the best results will be obtained.

The M. C. B. Association has done considerable work in determining the value of the coefficient of friction for different metals used for brake shoes. The effect of a low coefficient is so clear to everyone that it is not necessary to give it further attention at this time.

#### Performance of Baldwin Locomotive "Columbia."

The Baldwin locomotive "Columbia," which was exhibited at the World's Fair, has recently been tried on the Baltimore & Ohio railroad, making 15 round trips between Baltimore and Philadelphia between April 7 and 29, and on one day (April 28), running through from Washington to Jersey City and back to Baltimore. This engine is a four-cylinder compound and an illustration of it is shown herewith. It was more fully described in the *Railroad Gazette* of May 26 and June 16, 1893. It has two pairs of 7 ft. driving wheels, one pair of leading wheels 54 in. in diameter, and one pair of trailing wheels the same size. The fire-box is wholly back of the drivers and the cab gives room for the engineman and fireman on the same foot-plate, back of the boiler head. There is no equal-

short grades of 30 to 42 ft. per mile are encountered every two or three miles, the descending grades being such as to assist a train materially in getting over the following ascent. Foy's Hill, beyond the river, and 39 miles from Canton, is 200 ft. higher than the starting point; thence to Harmony, Del., 20 miles further, there is a net fall of 184 ft.; thence to Carrcroft, Del., 10 miles, there is a rise of 181 ft. The rest of the way is easy.

After one or two trial trips on slow trains, the brasses in the tender trucks were taken out and lead-lined brasses put in. On April 12, 13, 14, 15, 16, the trains named were hauled without difficulty although with the numerous stops the schedules are very hard to make. Time was made up on almost every trip, the engine steaming very freely with bituminous coal. It was then determined to try coke, and the brick arch was taken out of the firebox. A coke fire proved successful on an easy train, and on April 18 the Columbia was tried on trains 502 and 505, which are slightly faster than 503 and 510, but not so heavy. These trips proving successful, the engine was again put on trains 503 and 510. On the 19th, seven minutes were made up upon the southward trip. The next morning northward, 13 minutes were made up, the train consisting of five cars. Coke was used exclusively, although on the regular Baltimore & Ohio engines it was found necessary to mix some bituminous coal with the coke.

On Sunday, April 22, the Columbia hauled nine cars from Canton to Philadelphia, making schedule time. This is regarded as the best performance that has ever been made on this division, and Mr. Vauclain doubts if it has ever been equaled anywhere. The train, including the engine, weighed over 500 tons, and only half a tender full of coke was used. The best previous records made on this run by single expansion engines, with 78 in. driving wheels, are as follows: March 25, engine 855, nine cars, lost 18 min.; March 28, engine 857, eight cars, lost 16 min.

On both these trips there was coal mixed with the coke. Commencing Monday, April 23, about 1,000 lbs. of coal was placed in the bottom of the tender each trip, the coal being used to clear the sulphur off the flues, thereby saving the fireman some annoyance.

On the trip from Washington to Jersey City, April 28, the train consisted of one baggage car, three passenger and two Pullman cars, all vestibuled, weighing, including engine and tender, 270 tons. For the purpose of running through with one tender load of fuel, if possible, about 1,000 lbs. of coal and four tons of coke were taken on the day before, but it was found unavoidable to use about 1,000 lbs. of this before beginning the long trip.

On the return trip the train weighed about 300 tons exclusive of the engine, and the fuel was poor, being very fine coal. It was impossible to make steam and the pressure went down as low as 100 lbs., but the train reached Bound Brook at 5.55 p. m. on time, 42 minutes from Jersey City, and for the next 10 miles the engineman ran easy and allowed the fireman to make a better fire. This was accomplished and Philadelphia was reached at 7.19, on time, being two hours and 6 min. from Jersey City, 90 miles. There was a delay here for some new brake shoes on cars. The start for Baltimore was made 6 minutes late. At Newark the train was 12 minutes late, but it arrived at Canton on time, at 9.40.

It will be understood that to reach the Reading Terminal a detour has to be made, using up some 15 or 20 minutes. The ferry at Baltimore must also be deducted, as all trains consisting of more than four cars lose a little time there. The net distance from Washington to Jersey City is, therefore, 222.8 miles, which the Columbia traversed in 4 hours, 36 min., making 16 stops beside the terminal stops; and speed had to be slackened for 7 miles in Philadelphia and 2 miles in Washington, but the average inclusive speed was 48.5 miles an hour. Deducting three minutes for each of the 16 stops, the actual running time would be 3 hours, 48 min., or 58.6 miles an hour, which includes the 9 miles of moderate speed in Washington and Philadelphia. Numerous long stretches were traversed at 60 miles an hour; from Foy's Hill to Newark, 15 miles, 13 $\frac{1}{2}$  minutes and stop; Jenkintown to Yardley, 19.9 miles, 20 minutes, including start; Hopewell to Bound Brook, 17.2 miles, 16 minutes, including stop. The fastest mile recorded was one in 40 seconds and several were run in 41 and 42 seconds.

The tender load of coke was sufficient for 271 miles. The oil cups filled in Washington were in good shape on arrival in Jersey City; those on the back side of the eccentrics were filled once at Philadelphia. The cylinder lubricator was filled but once and it supplied the air pump as well as the cylinders for the entire distance. The engine ran from Yardley to Jersey City, 60 miles, without taking water.

The southbound trip, from Jersey City to Canton, was made at the rate of 45.7 miles an hour, including 8 stops. Excluding these the speed was 50.8 miles an hour. The comfortableness of the cab and the easy riding of the engine are indicated by the fact that one engineman and one fireman ran the engine these 422 miles in one day.

On these heavy trains, always pushed for time, the saving in water by the compound system is decided advantage. The Columbia with six cars made up 8 min. on train 510, April 29, being able to run from Swan Creek to Philadelphia without taking water. None of the regular engines can do this. On trains of six cars the consumption of coal seems to be about one-third less than with the regular single expansion engines. With nine cars the percentage saved is greater.

The bearings have run perfectly cool, requiring no oiling between termini. The engineman says his oil cups would run a week without refilling, and the truck boxes require hardly any attention, the wheels being 54 in. in diameter.

#### Modifications of Von Borries' System of Compounding.

There seems to be a growing belief among locomotive designers that a two-cylinder compound, in order to be most easily and effectively handled and of the greatest general utility, should be so arranged that at starting or at any other time when a maximum of power is required, the exhaust from the high pressure cylinder can be turned into the atmosphere and the low pressure cylinder supplied, through an auxiliary passage, with steam direct from

or close the passages as required. With the piston in the position shown, the engine works compound, the opening A to the atmosphere being closed and the exhaust from the high pressure cylinder from passage B passing through

flow into the main cavity of the valve through the space between the seat N and the reduced body of the valve which passes through it. The piston or head E is carried to the position shown by the dotted lines, thus turning the high pressure exhaust from B to the atmosphere through opening A, and allowing steam to flow from the auxiliary pipe, out through opening C to the receiver and thence to the low pressure cylinder.

In order to provide for unequal expansion and allow pistons E and F to become properly seated, piston E is mounted loosely upon the rod D with a small amount of longitudinal clearance, the steam pressure behind it being sufficient to cause it to properly seat itself when working compound. Figs. 5 and 6 show the location of the intercepting valve and the arrangement of steam and exhaust pipes and passages.

#### The Postal Telegraph Building in New York City.

The *Electrical Engineer* for April 18, contains a 22-page article describing the magnificent new 14-story building just completed in New York by Mr. John W. Mackay for the use of the Postal Telegraph-Cable Company, of which he is the chief stockholder. This building stands at the corner of Broadway and Murray street, and, with the white marble building of the Home Life Insurance Company adjoining it on the north, makes one of the most prominent landmarks in the city. The electrical equipment of the Western Union building, as it was re-modelled after the fire in 1890, was described in the *Railroad Gazette* of February 5, 1892.

The description before us is divided into 23 chapters and is illustrated with numerous direct process cuts. It consists largely of carefully prepared technical descriptions of the electrical apparatus, including the latest improved forms of quadruplex apparatus and telegraph repeaters. The chapters are so full of information that it is impossible to condense them and we shall therefore merely indicate their titles and general contents. The first gives a historical sketch of opposition telegraph companies in this country, Mr. Albert B. Chandler, President of the Postal Company, being accorded the principal credit for the successful management of this strong rival of the Western Union. Chapter II gives a general description of the building. It was put up under the direction of a building committee composed of Messrs. Chandler, William H. Baker, G. G. Ward and E. C. Platt. The architects were Messrs. Harding & Gooch, and the electrical contractor I. Lemaire. The building is 70x156 ft. with an L, 30x50 ft. The material is Indiana limestone to the fourth story and soft gray brick above. The frame is of steel. The first floor is occupied as a receiving and delivering department, the second to the tenth inclusive, are rented, the eleventh is occupied by the executive officers of the telegraph and cable companies, and the twelfth, 18 feet high, is the main operating room. The thirteenth is devoted chiefly to the restaurant, and the fourteenth has been rented to the Hardware Club.

Chapter III describes the dynamotor telegraph plant. The machines are Crocker-Wheeler and each is independent of every other. These machines occupy a space only 10x20 ft. and generate the electric currents for the entire telegraph system worked from the building. The switchboard for these dynamos, and its connections, are described in detail. Chapter V describes the underground cable room, all the wires entering the building through the basement. Next come descriptions of the operating room and the main telegraph switchboard, with details of ingenious inventions in connections, etc. The operators' tables have no partitions, the sounders all being placed in resonators close to the operator's ear. The tables have an ingenious removable top which admits of the use of a typewriter, and many of these are used. Each operator owns the machine that he uses. The quadruplex apparatus used by this company is one devised by the chief electrician, Mr. F. W. Jones, who is credited with the general design of the electrical arrangements in the building devoted to the telegraph department. This quadruplex is fully described, as is also the Weiny repeater. There is an elaborate system of pneumatic tubes for distributing messages, and the valves and other details of these are carefully described. Chapters XI and XII are devoted to the Sprague-Pratt electric elevators, of which there are six, four of them being devoted to the four upper floors exclusively, being used almost wholly for the operating room and restaurant. The bold project of putting in elevators dependent entirely upon electric motors is stated to have been entirely successful, and Mr. Sprague claims to have written the epitaph of the hydraulic elevator. Five pages altogether are devoted to these elevators and their operating mechanism. Chapters XV-XIX describe the Westinghouse dynamo and engine plant.

#### A New Hydraulic Boat Lift.

The Krupp-Gruson Works in Magdeburg have constructed a model, in one-tenth natural size, of a hydraulic lift for boats of 800 tons capacity.

The difference of height in canal levels is assumed to be 46 ft. The lift-basin, which is 28 by 223 ft., with a mean depth of water of 8 ft. 3 in., rests on 24 latticed columns, arranged in six groups of four each. Each column is carried by a water-tight cylinder floating in a water-filled well. The capacity of the cylinders is such that their buoyancy will keep the lift basin in equilibrium midway between the upper and lower canal levels, when it contains its mean quantity of water. By diminishing or increasing this quantity the basin is raised or lowered.

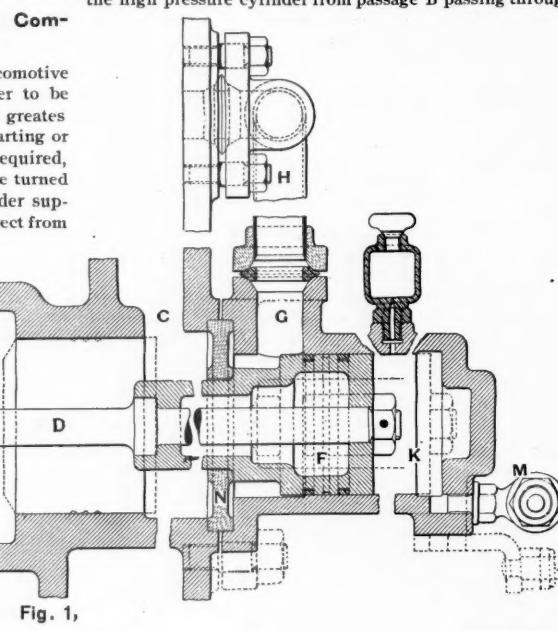


Fig. 1.

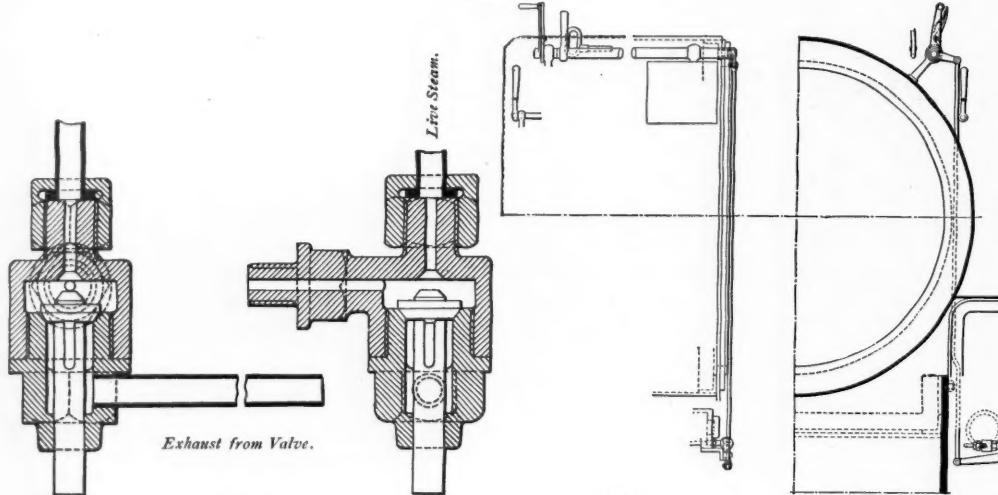


Fig. 2.

Fig. 3.

Fig. 4.

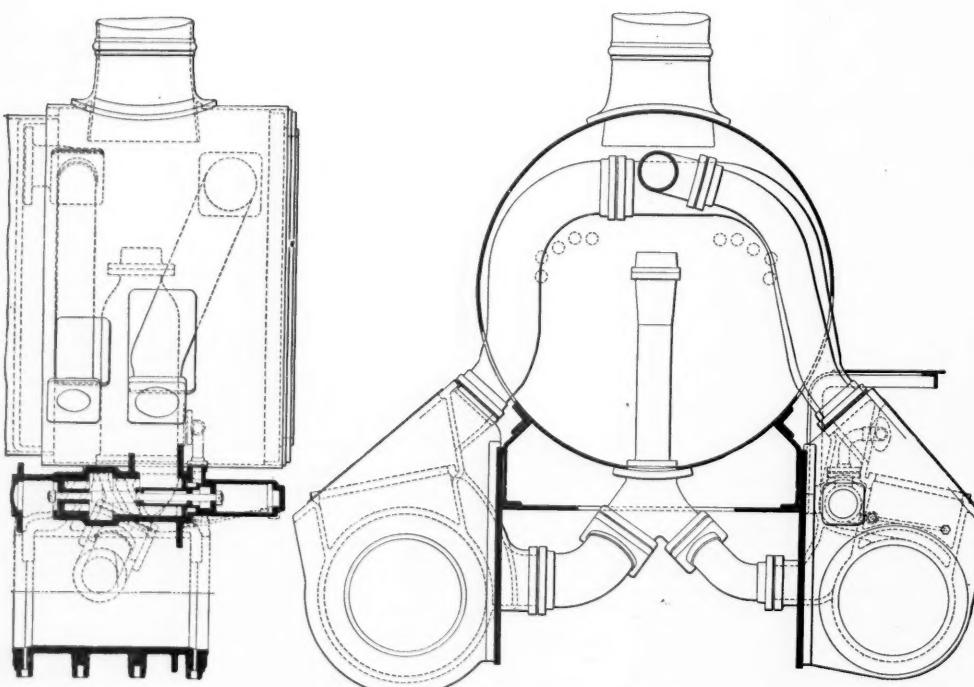


Fig. 5.

Recent Modifications in Von Borries' System of Compounding Locomotives.

the boiler at a reduced pressure. Various arrangements accomplishing these results have been devised by well known designers, one of the more recent being that invented by Mr. A. von Borries whose automatic system of compounding locomotives is now so extensively used in Europe.

The intercepting valve used in Mr. von Borries' late design is shown in section in fig. 1. It is placed horizontally, above and inside the high pressure cylinder. It consists of a chamber having three main openings; a leading to the atmosphere, B to the high pressure exhaust passage and C to the receiver from which the low pressure cylinder is supplied. Communication between these passages is regulated by the movement of the piston rod D upon which the heads E and F are so mounted as to open

the chamber and out through passage C into the receiver. The auxiliary steam pipe H conducts steam from the branch pipe leading to the high pressure cylinder, to the opening G above piston F. The piston is held in the position shown by steam at boiler pressure in chamber K, supplied through a small auxiliary pipe, and valve M, the construction of which is shown in fig. 2. This valve is controlled from the cab through the mechanism shown in figs. 3 and 4. If it is desired to run the engine single expansion the handle in the cab is placed in the position shown in fig. 4, thus cutting off the flow of steam through valve M and allowing the steam in chamber K to flow to the atmosphere. The steam pressure in the annular space around piston F then forces the piston to the end of chamber K, and allows a small amount of steam to

It is guided laterally between two pairs of vertical racks fastened to two pairs of latticed towers built alongside of it. Each pair of towers is connected by overhead bracing. Into the racks gear spur wheels, which are connected to a stiff overhead frame on top of the basin, and which are operated from an engine placed on the frame. The spur wheels, actuated by the engine, serve as brakes when the moving lift basin approaches one of its extreme positions, or assists in moving it.

The ends of the basin, and likewise the ends of the canal, are closed by vertical sliding doors, which are pressed tight against a caoutchouc rim by the inside water pressure as long as basin and canal are not connected. As soon as the lift basin has reached either its lowest or highest position, water is admitted into the space between its doors and that of the corresponding canal end. The water pressure is so equalized on both sides of the doors, which latter are lifted by hydraulic power. The boats are towed into the basin and out of it by means of hydraulic capstans.

A full description of this lift work, of which this is an abstract, is to be found in the *Revue Technique*.

#### **Oil Cup for Main and Side Rods.**

The accompanying drawings show the construction of an oil cup, which embodies several improvements in the application of oil to the crank pins of locomotives or other rotating parts of machinery requiring lubrication.

The body of the box is of brass, polished outside and rough turned inside to insure lightness and freedom from sand or grit. The top is also of polished brass with a large hexagon for a wrench and so fitted as to screw tightly into the body of the cup. The cup is secured to the rod by a central stem of steel, projecting through the bottom of the box, and threaded at the upper and lower ends, the lower end screwing into the rod and the upper end carrying a cap which regulates the feed of oil. This stem has a  $\frac{1}{16}$  in. hole extending from the top to a point

monographs on the history and principles of signaling that ever was written, perhaps the most valuable, and I doubt not that it has supplied many of the wise words on signaling that have appeared in sundry catalogues and in some of the contributions to the columns of the *Railroad Gazette*, for it is well-known to the closer students of signaling. It may not go amiss, however, to give to those readers who have not been special students of this art some notion of the value of this Rapier. It may whet their appetites and lead them to seek further acquaintance with him in those dim and dusty libraries where he may be found.

The first fixed signals of distinctive character appear to have been devised by Edward Woods, C. E., and indicated danger. For many years only danger signals were given by positive indications, and it is very interesting to see that the first idea of the men who originated fixed signals was the same as the first idea of the inventor who comes fresh into this field now, that is, to make the danger signal and not the clear signal the positive one. The fallacy of this idea is too well known to signal engineers and railroad men now to need emphasis, but it might not be a bad notion for the railroad men to whom a brand new system of signaling is brought to ask its inventor to carefully read Rapier as a preliminary to having his system considered at all. Such a practice would save a good deal of valuable time.

It was Mr. C. H. Gregory, past-President of the Institution of Civil Engineers, who, late in 1841, designed and erected at New Cross the first semaphore signals for railroads, and Mr. Rapier says that it was the most important step in the development of railroad signals, and it is interesting to learn that from the first counterweights were used to make the signal go to danger.

After the introduction in England of the semaphore signal, there arose the question as to how its indications should be given. With the development of the caution signal, it was at once seen that by using three positions of the semaphore arm, the three signals, danger, caution and

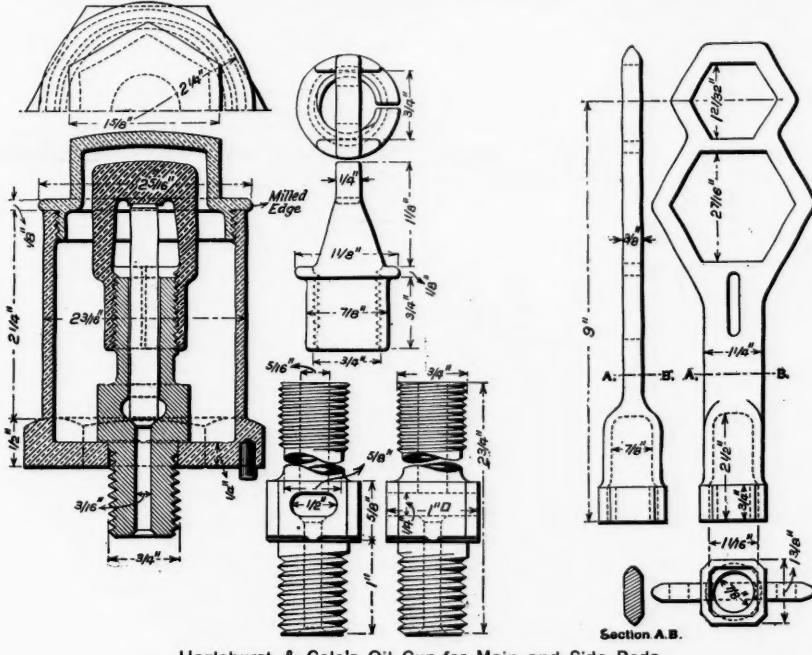
here we can ever do away with the three indications of signals.

The movement which has recently been under discussion in favor of using green for a clear signal, leaving red for danger, and using some intermediate color for caution, brings us at once to face the great difficulty of finding a satisfactory color for the caution signal by night. On one of the leading Western roads, this Gordian knot has been cut by combining red and green for the caution signal by night, on the principle that the more important color, red (signifying "stop"), being first seen, any misreading of the signal would be an error on the safe side, and the engineer, on nearer approach to the signal, would then discover the intermediate qualification of the green, and so, having slackened speed and thus prepared to stop, he would practically have acted as he should have acted if he had first recognized the signal as a caution signal. While this signal may have, and we are assured that it has, given fair satisfaction, at least to the management of the road, it can hardly be advocated on principle, for the reason that it is a weakening of the force of the danger signal, for which, in the minds of many experienced railroad managers, the color red should be sacredly reserved, free from all qualification, and never to be displayed for any other purpose whatever than to give in a clear and even startling manner the command, "Stop."

Where color alone is relied on for night signals, there has never been any serious thought of making any other color than red serve for the danger signal. It is true that on one road in this country, white has been used for the danger signal, but in this case color was disregarded, two white horizontal lights giving a "position" danger signal, and two vertical (green) lights a position "clear" signal. Recognizing the further principle, that giving to the safety indication a distinctive color, we may well believe, therefore, that no other color than red will be used to mean danger. If green be used for safety, we have the difficult task of selecting, or rather, of practically obtaining, a satisfactory color for the caution signal by night. All tones of yellow must be ruled out, since the ordinary "white" light is itself yellow or orange, as any one can see by contrasting it with the pure white of a neighboring arc light. Since we have to eliminate the ordinary white (yellow) light from our color scheme, only confusion would result by adding anything bordering on the yellow tone. Blue is out of the question, from practical considerations, for if glass of a light blue color be used, a flame shining through it will look almost like white light, especially when seen in contrast with red or green; while if a strong blue tint be used, the glass would be so opaque as to be of little value in railroad signalling. The tertiary colors being, of course, out of the question on account of the uncertainty in classifying the particular shade, we are really driven to the only remaining color, namely, violet,—that which is seen at the extreme end of the spectrum and which is not purple, for that is too near blue, while violet has a distinctly reddish tinge; and here there seems to be an objection to its use. If it is to have an important signal meaning, it is certain that in fast running under the block-signal system, there is no more important signal than the distant signal, and unless we are to adopt the European practice and make its horizontal position red, it is a question whether it would not be a dangerous thing to adopt a light violet, but a few shades removed from white, which might be termed by color-blind experts a "confusion" shade. This again brings up the important point that if the scheme of red, green and violet color only be used for night signalling, it would be of the greatest moment to eliminate from the railroad service all engineers who are in any degree color-blind. However clearly visible, and apparently well differentiated the red and violet colors may be under the most favorable conditions, it will take a nice eye for color to always discern the difference between them when their hue is modified perhaps in a very great degree by smoke, vapor and unfavorable atmospheric conditions. Under such unfavorable conditions, perhaps during a time of storm, he would be the more likely thus to err; this would be certain in time to result in disaster.

It is a question with many practical railroad men whether there is sufficient reason for abandoning the present scheme of color, long recognized by the standard code and to which railroad men have been bred, so that their significations have been branded, as it were, into their very being; and here it is that the illuminated semaphore ought to prove an important aid in solving this perplexing question. As a recent editorial in the *Railroad Gazette* has well expressed it, there is no need to see a railroad signal, particularly a distant signal, a great distance in advance of the same. In fact, however, the illuminated semaphore can be seen much farther than any violet light will show, since it uses for its clear signal the unobstructed white rays, which have the greatest degree of penetrating power; and, since its clear signal is so distinctive and quickly recognized, its absence from the accustomed point at which it is displayed would be instantly noticed even by a careless engineer. It must be admitted, however, that much of the argument stated would lose its force if in this country we should come to adopt the foreign practice of having but two signal meanings by night, namely "all clear, go on," and "danger, stop."

Distant Signals seem to have been first introduced in Scotland in the year 1846, and were at first put about 50 yards on either side of the points-man's box; but, having to walk to and fro so many times a day in order to set the signals, the canny Scot arranged a wire, with a few rail-chairs for a back-balance weight, so that from his box he could



Hazlehurst & Cole's Oil Cup for Main and Side Rods.

near the base of the cup where it is intercepted by a cross feed hole. From this point downward is a  $\frac{1}{16}$  in. hole. In the upper end of the stem is an iron spindle fitting loosely in the  $\frac{1}{16}$  in. hole and ground to a joint at the point where the diameter of the hole is reduced. The vertical lift of the pin is limited by the cap, which is of brass and sawed open at one side so that it can be closed up so tightly that when once set its position can not be altered by the motion of the engine.

The advantages of this cup are that it cannot be broken or thrown off by the motion of the rod, as the central stem is of steel, separate from the body, nor can it be stolen by unscrewing it or breaking it off. The stem can be unscrewed only by a special socket wrench which reaches to the bottom of the cup. This wrench is also adapted to the adjustment of the feed cap and fits the cap and the base of the cup.

The cup has a positive spindle feed, automatically shutting off the supply of oil when the engine stops, and of sufficient weight to vibrate in heavy oil. It is easily adjusted; the amount of feed can be seen by removing the cap, and the feed adjustments are all within the cup.

The cup is the invention of Messrs. F. J. Cole, Mechanical Engineer, and G. B. Hazelhurst, General Superintendent of Motive Power of the Baltimore & Ohio, and is now in use on a number of railroads, several thousand having been made.

#### **Modern Railroad Signaling.**

BY C. A. HAMMOND, M. AM. SOC. M. E.

In the Minutes of Proceedings of the Institution of Civil Engineers, Volume XXXVIII, 1873-74, may be found a paper by Richard Christopher Rapier, Associate of the Institution, "On the Fixed Signals for Railways," which has long been out of print and unpurchasable except by accident. This is a pity, for it is one of the most valuable

safety, could be given; the danger position (horizontal) and the clear signal (vertical) having properly been given the extreme positions of the blade, the caution signal naturally came in midway between the other two. Thus we find that in England, as is true in this country, on some roads the three-position signal was used, and on others, the two-position: horizontal for "stop" and inclined for "go on." The latter scheme was conceived to be right, for the reason that wherever the block signal was in use, the caution signal would mean precisely the same as the clear signal, namely, "go on" to the next signal post, and if not, then no amount of caution would afford security. Another reason for abolishing the caution signal and adopting 45 or 60 deg. for the clear signal was, that when the arm is vertical the signal is practically absent, thus reverting to the wrong principle that the absence of a signal means safety; while on the other hand, the horizontal position for "stop," and the inclined position for clear, can always be seen. The arc of 60 deg. was preferred to that of 45 simply because it was found to be less unfavorably influenced by variations in the length of the signal wires, caused by changes in temperature, which would indicate that the art of compensating signal wires had not then been perfected.

It may be said that the final outcome of the discussion between the advocates of the three-position and those of the two-position signals was in favor of the two-position only, so that in English as well as in Continental practice, no difference is made at night-time between the danger signal and caution signal. This at once permitted the elimination of white for the clear signal at night, which was strongly advocated on some lines and which has now received official sanction in English practice. In this country, however, owing to the need which seems to be felt on many lines for using the block signal system permissively, the caution signal has become of far more importance in our practice; so that it is not probable that

and other signal to safety. This arrangement was found so convenient that the distant signal was afterward placed 250 yds. in advance of the points of danger, and in 1852, the Great Northern Railway was completely fitted with distant semaphore signals. Another interesting evolution in English railroad signalling was the order in which signals should be read when more than one was displayed on the same post. The first practice seemed to have been to put the main-line signal at the top, then the "main platform" line, the "goods" line, and after that, the "through crossing" or other subordinate lines in a regular order. A later plan arranged the signals so that the top blade should govern the road farthest to the left (the Englishman runs on the left-hand track as everyone knows and the signals are placed on the left of the road), and so on in regular order, the lowest blade indicating the extreme right-hand track. By the first plan it was contended that the driver of an express train has the advantage of always knowing that the top signal is for him, regardless of what station he might be approaching or what arrangement of tracks he might find there; whereas by the new plan, he had to know where he was and then pick out his own signal accordingly, which might be the first blade in one case, the second in another, and the third or fourth in others.

Another modification was to place all signals, say four or five of them, on the same bracket, giving a post to each, but even then it was soon found necessary to put the main-line signal higher than the others, and thus there was no compensating advantage in increasing the top weight of the bracket. Once having found it necessary, however, to increase the height of the main-line signal, this principle finally prevailed, having the merit of simplicity, certainty and reasonableness.

Owing to the peculiar climatic conditions of England and the unusual prevalence of foggy weather, it was soon found necessary to supplement visible signals by those which should appeal to the ear also, and it was in the year 1841, the same year that witnessed the invention of the railroad semaphore, that Mr. E. A. Cowper, also a member of the Institution of Civil Engineers, designed

Before concluding the writer would mention a point suggested several years ago in a discussion on an English paper regarding signal lights, in which the idea which we have recently heard advanced was brought out, that night signals should be given by powerful lamps; and a Mr. Douglas regretted that the paper in question had neglected to discuss the improved signal lamps, of which presumably he was the inventor. He advocated immense parabolic reflectors like those we use for head-lights, two of which, mounted in a great lantern, gave the proper signal indication; but as the expense was \$50 or \$60 apiece it may be surmised that the benefits which seemed so clear to Mr. Douglas were not equally obvious to the railroad managers; and indeed, as pointed out above, it would seem to be a false principle of signalling, anyway, to seek to make signal indications visible at great distances, since, with the necessary multiplication of signals, as traffic and the necessary terminal accommodations increase, there would be great danger of confusing the near with the farther signals. What is particularly needed for a railroad signal is distinctiveness, and too much emphasis cannot be laid upon this point. It was the writer's experience with illuminated blades, at a point where they were surrounded by street and electric lights, that has led him to the conclusion that a distinctive form of signal, even if not visible three miles or even one mile away, is much more desirable than an extraordinary increase merely in the brilliancy of the signal light, if its distinctiveness (and this can best be secured by form principally) be lost sight of.

#### The Johnson Boiler Tube Expander.

The engraving Fig. 1 shows a new self-feeding boiler-tube expander, made and sold by the Henry C. Ayer & Gleason Co., of Philadelphia. Fig. 2 shows the construction of this tool. It consists of a central taper-shaped roll with a capstan head surrounded by five smaller rolls, whose knobbed ends are encased in a collar. When the central taper shank is forced in and at the same time turned, it causes the smaller rolls to revolve and to expand

service, and are built of steel and iron, the floors being covered with an insulation of firebrick to prevent injury to the cars by heat. To exclude the heat from the trucks and underframe of the cars, a sand seal is provided along each side and the cars kept fastened closely together. This has the effect of dividing the kiln into two chambers, the upper one being used for the combustion and the lower kept cool by numerous openings. With a heat of 3,000 deg. Fahr. in the combustion chamber, the underframes of the cars are only slightly warm. The tunnels are always kept full of cars when heated, and are provided at each end with sliding doors of sheetiron, which are raised only for the admission and exit of the cars. At each end is provided the necessary apparatus for moving the trains, in the present case consisting of a winding drum with a cable, which is attached to the foremost car. In kilns to be built hydraulic machinery will perhaps be employed. The necessity of having this at each end is that the two trains move in opposite directions. Also at each end is a transfer table, upon which the cars run as they are drawn out of the tunnel.

The loading and unloading apparatus was merely put up for the occasion, and consists of endless chains with scrapers attached, but this method will not be employed when a kiln is built expressly for garbage cremation. In the operation of burning the garbage each car as it enters the tunnel runs under a hopper and is loaded with garbage. On entering, the heat at first is sufficient to begin the evaporation of the moisture, and by the time the car reaches the flames in the centre of the tunnel the garbage is thoroughly dried out. To allow the flames to come into contact with all parts of the garbage the mass is stirred by means of long iron pipes, through which is forced a current of compressed air, which not only thoroughly stirs up the dry garbage, but also assists the combustion. By this method refuse consisting of a mixture of garbage proper with a large quantity of ashes and cinder, which heretofore has been burned with difficulty in crematories, is here readily disposed of, as the air effectively stirs up the ashes and prevents them caking down. The cars on issuing from the tunnel pass under an endless

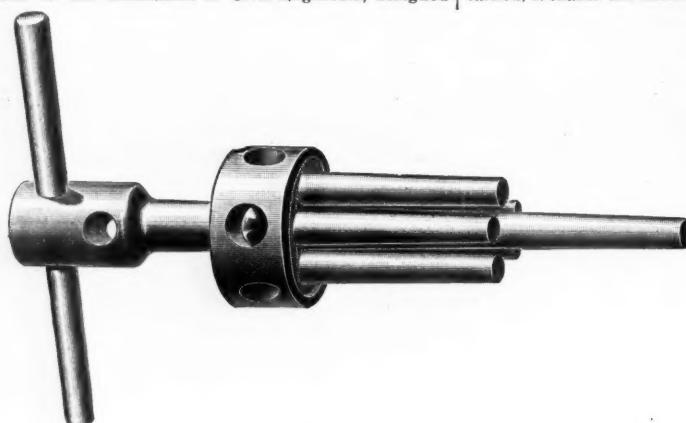


Fig. 1.

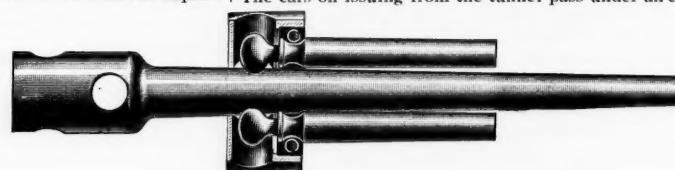


Fig. 2.

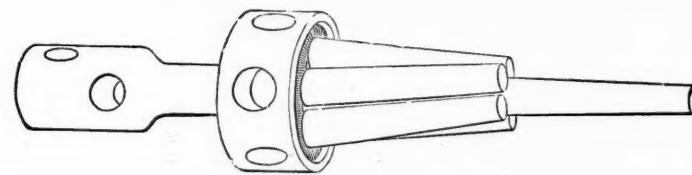


Fig. 3.

#### The Johnson Self-Feeding Boiler Tube Expander.

what was known as the detonating fog signal, which is almost universally used on English roads, and consists of a small metallic case with two leaden ears to hold it to the head of the rail, ordinary gunpowder being used for the explosive mixture, fired by the crushing of a couple of Promethean matches, which were made with a small glass bulb of sulphuric acid, around which was wrapped in paper a little chloride of potash and sugar; afterward, fulminating powder was used. By way of coincidence, it was Mr. Gregory, the inventor of the semaphore, who first allowed the detonating signal to be tried on the Croydon Railway, and adopted it as a standard device.

English invention in signalling was then as active as we find it here to-day, and a host of contrivances sprang up intended to give signals to the driver of an engine by bell or whistle, but nothing ever came of them. Electrical devices were also used; for instance, on the Northern Railroad of France, a metallic brush took current and opened a steam whistle on the engine to arrest the driver's attention "provided all goes well with the apparatus." The objection was made, however, that the driver, hearing no signal, would suppose that his way was clear, and that this would set up the principle that the absence of a signal implies permission to proceed, so that all plans of audible signals were dismissed as merely reverting to the old idea of giving danger signals, a system which the author pronounces as entirely inadequate to the requirements of English railroads.

Electrical devices, however, were early seen to be important in connection with interlocking work, and, in fact, the telegraph may be said to be the corner-stone of block signalling. By the absolute block system, the greatest possible number of trains can be made to travel over a single pair of rails in a given time, but the complete installation of interlocking plants was found indispensable to the success of any block signal system. With the enormous traffic that is handled at terminal stations in England, particularly in London, where, at the time of our author's writing, at Moorgate street station, over 1500 movements of engines and trains were made over four lines in 19 hours, every movement of which required to be distinctly and separately signalled, it is admitted that these remarkable results would have been absolutely impossible without electrical instruments of communication and protection.

the tube. The twist given to the capstan bar is transmitted to the tool itself, which turns the small outside rolls at an angle with the axis of the tube, as shown in Fig. 3. The counter revolution of the small rolls, produced by the direct rotation of the central shank, causes them and therefore the tool as a whole to advance into the boiler tube without forcing or driving. Being slightly tapered any advance must be attended by an expansion of the tube. When the tool is turned in the opposite direction the outside rollers straighten themselves with regard to the central pin or shank which releases the tool.

It is claimed that in the usual form of boiler tube expander the driving of the center pin not only damages the tool but injures the tubes. This tool has special advantages in scaly or old flues as it has not the tendency to produce leaks that those driven with a hammer have. The tool has been in continual service for three years in the Delaware, Lackawanna & Western Machine & Car Shops at Kingston, Pa., and is said to be in as good condition now as when first used.

The tool in the hands of an apprentice boy has a record in the Lackawanna shops of expanding one end of a full set of 220. No. 11 W. G. flues in 10 hours, without the use of a hammer, and the job was so well done that no caulking was necessary for two years, though the engine was in daily passenger service. It is made in sizes from 1½ to 7 in. inclusive.

#### Some Results in Garbage Cremation.

The results of the recent trials of a new system of garbage cremation in Chicago, the invention of Mr. James C. Anderson, have been favorable. Not only was the quantity burned large, but the residue, after cremation, was but a small per cent. of the original.

The crematory used was the tunnel kiln, in which the pressed bricks of the Chicago Anderson Pressed Brick Co. are burned. This kiln consists of two brick tunnels having a common wall between them, each capable of holding ten ordinary flat cars. In the sides of these tunnels, for the space of about two car lengths each way from the centre, are openings on a level with the floor of the flat cars, and through these the flames from burners using crude petroleum impinge on the contents of the cars. These cars are about the size of those used in freight

chain provided with scrapers, and the small residue is removed. By means of the transfer table they are shifted to the other tunnel, loaded, and run through the second tunnel in the opposite direction from which they passed through the first. The heated gases escaping from one tunnel pass through a flue partially surrounding the other tunnel, and thus assist in heating its walls. The capacity of the kiln where the tests were made is 100 tons an hour.

In this same kiln a few weeks ago was tried the experiment of coking the refuse slack from western coal mines. The trial seemed entirely successful, a good domestic coke of a bright silver tint being produced. This coking process makes it possible to utilize the by-products which under the old system go to waste.

#### Corrosion of Pipes and Cables from Electrolysis.

In our issue of April 6 appeared an article on the above subject which showed injuries to pipes and cables by the return currents from the trolley electric system. In a paper entitled "Destructive Effect of Electrical Currents on Subterranean Metal Pipes," read before the eighty-sixth meeting of the American Society of Electrical Engineers on April 18, Mr. I. H. Farnham gives further data on the subject and mentions some remedies proposed.

First: It had been proposed to remove all cables from the wet bottoms and sides of manholes, but it was found difficult to place and retain cables free from the wet sides. Had this been accomplished the action at the mouth of and within the ducts would have still continued. They were, however, all removed from the bottom.

Second: Ground plates constructed from pieces of old lead cable, 6 to 10 feet in length, were embedded in wet earth at the bottom of manholes in the hope of transferring the electrolytic action to these plates. In some cases the voltage between the cables and the earth was reduced 25 per cent.; in many others no noticeable reduction was made.

Third: A plan suggested, but not tried, was placing motor generators operated by the railroad power current at different points along the line where cables and pipes were in danger, the secondary current developed to be utilized to lower the potential in the cables and pipes to zero, with respect to the surrounding earth or rails. The

generators were to be automatically started and stopped as the cables became positive or negative to the rails. The object was to force the current out of the cables and into the rails whenever the potential of the former should rise above zero.

**Fourth:** Some of the worst cases of corrosion occurred where cables were painted with asphalt, taped, painted again and finally covered with a heavy braiding also saturated with asphalt; so sufficiently protect cables and pipes by insulation would, if practicable, be difficult and expensive.

**Fifth:** As severe electrolytic action is frequently found in comparatively isolated spots, where cables and pipes cross each other or pass near or across the rails, any system of breaking the metallic continuity of the cable sheath and pipes would have to be studied with reference to the entire complicated system of pipes, cables and rails. There would also be a difference of potential between the several sections of cable or pipe, severed metallically, tending to cause electrolysis at one end of each section. In case of water pipes the action might be expected on the interior as well as the exterior. Evidence of this also appears in gas and water pipes where the electrical continuity is partially broken by lead joints.

**Sixth:** A careful experiment of alternating the current was conducted for ten days, employing a pressure of from three to seven volts and alternating its direction at regular periods of one minute. The theory was that before the oxygen gas, liberated by the current, would have time to attack the metal the reversal of the current would disperse it. No material change was apparent. The practicability of reversing the current frequently was then considered. It proved possible only to reverse it once each night, when the load is comparatively light. With an experiment on this basis it was found at the end of two weeks that plates subjected to the action of the current were seriously electrolyzed. Even had this proved advantageous in a large system involving several power stations, it would require either a loss of current for a few minutes in order to guard against one station reversing before some other had opened or reversed its current, or else the installation of some electrical system connecting the several stations and operating the reversing apparatus simultaneously would be necessary. When alternating current motors become practicable for use on street cars, advantage may be taken of the fact that such currents appear not to cause electrolysis to the extent of injuring pipes and cables exposed to them.

**Seventh:** It was suggested that the current used in operating a certain road, at that time using the overhead wire for the negative pole, be reversed so that the positive or outgoing current would be connected with the trolley, claiming that the danger of electrolysis would be removed from the greater and more scattered portion of the city and brought near the power station, where it could be more easily dealt with. This reversal was made on the West End Street Railway of Boston. The cables near the power house which had been from one to two volts negative to earth before the change of current, were now one to nine volts positive to earth. Fig. 1 shows the current flowing through trolley, car, rails and cables at this time. It will be readily understood that with the conditions illustrated in this figure the electrolytic action would be confined to the territory comparatively near the power stations where the current is leaving the cables to reach the negative or rail side of the dynamo.

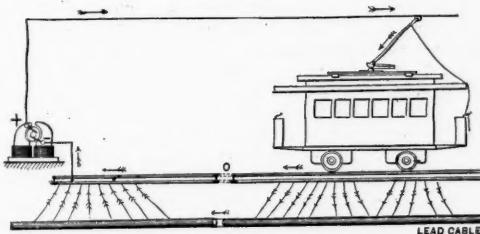


Fig. 1.

Another plan was this: Return conductors composed of a large number of No. 18 copper wires formed into cables about one inch in diameter (known as conductors of 500,000 mils.) were run from the negative side of the dynamo and connected at frequent intervals to telephone cables, and connected at frequent intervals to telephone cables,

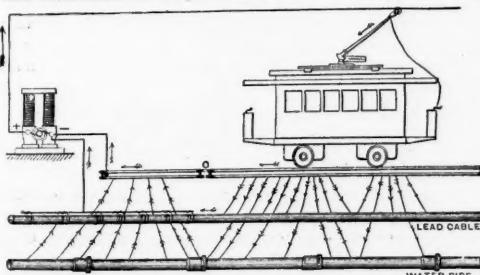


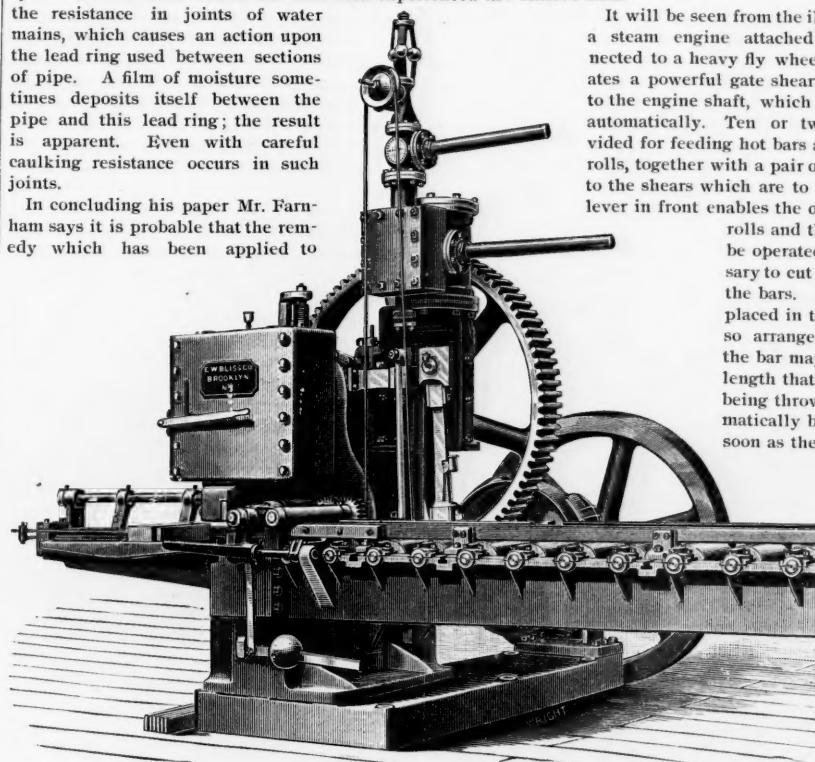
Fig. 2.

as in Fig. 2. By the system of motor generators this low resistance conductor connected directly to the dynamo was to pump the current from the cables and so prevent its passage into or through the moist earth. Voltage measurements showed after experimenting that cables measuring nine volts positive to earth gave a reading of 22 positive to the return conductor; that is, the return wire as relating to the cables, was at all points more negative than the earth. Cables in every manhole within a certain district of Boston were connected by several No. 12 copper wires to the return conductors. On first connecting the

current was sufficient to melt several strands of the wire. Measurement for current flowing in the main return conductor which was used for relieving the cables, only gave about 500 amperes.

The above experiments deal mostly with lead-covered telephone cables. Iron water and gas pipes have to be treated in a similar way, as they are as truly subjected to corrosion as lead, and are as readily destroyed by electrolysis. Considerable trouble has also been experienced in the resistance in joints of water mains, which causes an action upon the lead ring used between sections of pipe. A film of moisture sometimes deposits itself between the pipe and this lead ring; the result is apparent. Even with careful caulking resistance occurs in such joints.

In concluding his paper Mr. Farnham says it is probable that the remedy which has been applied to



Bliss Automatic Muck-Bar Shear.

telephone cables in some cities has been the more positive from the very failure to thoroughly protect the other systems of pipes against electrolytic action. Cables are connected by a large wire to the dynamo, while water pipes are not. Therefore the current flows from the water pipes to the ground and thence to the cables in order to reach the dynamo. Connecting any one system of pipes to the dynamo will in a measure protect other systems of pipes; but connecting all systems reduces the certainty or margin of certainty of protection to any one system.

The question has already arisen, how small a difference of potential between pipe and earth will cause electrolytic action. In reply to this it may be stated that some of the worst cases of corrosion in Boston have occurred where the difference was but  $1\frac{1}{2}$  volts. Some of the first cases in Cincinnati showed upon examination that the difference between the cables and the rail was never more than  $\frac{1}{2}$  and usually less than  $\frac{1}{4}$  volt. Such a difference between cable and rail would mean a much less difference between cable and earth, where electrolysis takes place. Mr. John C. Lee, of Boston, has experimentally caused the corrosion on lead and iron by a difference of potential of 1-100 volt.

These facts certainly indicate that a very small pressure produces action and should dispel the numerous statements that well bonded rails or a large amount of rail return wires will alone overcome the trouble. In some cities, where electrolysis occurs, the return copper nearly equals that of the trolley and feed wire system. We cannot force the current to take one path exclusively when others are open to it.

The facts given above, with others similar, lead to these conclusions:

1. All single trolley railways employing the rails as a portion of the circuit, cause electrolytic action and consequent corrosion of pipes in their immediate vicinity, unless special provision is made to prevent it.

2. A fraction of a volt difference of potential between pipes and the damp earth surrounding them, is sufficient to induce the action.

3. Bonding of rails, or providing a metallic return conductor equal in sectional area and conductivity to the outgoing wires, is insufficient to wholly prevent damage to pipes.

4. Insulating pipes sufficiently to prevent the trouble is impracticable.

5. Breaking the metallic continuity of pipes at sufficiently frequent intervals, is impracticable.

6. It is advisable to connect the positive pole of the dynamo to the trolley line.

7. A large conductor extending from the grounded side of the dynamo, entirely through the danger territory and connected at every few hundred feet to such pipes as are in danger, will usually ensure their protection.

8. It is better to use a separate conductor for each set of pipes to be protected.

9. Connection only at the power station, to water or gas pipes, will not ensure their safety.

10. Connection between the pipes and rail, or rail return wires, outside of the danger district, should be carefully avoided.

11. Frequent voltage measurements between pipes and earth should be obtained, and such changes in return conductors made as the measurements indicate.

The Cramp Ship Building Co., has, it appears, offered to build two or more ships for the British navy, but Mr. Cramp, the President, does not talk as if his offer had been very favorably considered.

#### Bliss Automatic Muck-Bar Shear.

Herewith is an illustration of a new tool that has been designed to supersede the earlier form of shear known as the alligator shear. In practice the old form of shears has required from two to three men to operate it, one a skilled and experienced man. This tool is calculated to do more and better work with the attention of but one unskilled man.

It will be seen from the illustration to consist of a steam engine attached for driving and connected to a heavy fly wheel which in turn operates a powerful gate shear. A clutch is attached to the engine shaft, which is operated by hand or automatically. Ten or twelve rollers are provided for feeding hot bars as they come from the rolls, together with a pair of direct feed rolls close to the shears which are to feed it positively. A lever in front enables the operator to control the

rolls and the shear so that it may be operated by hand, as is necessary to cut and square the end of the bars. An automatic gauge is placed in the path of the bar and so arranged that the progress of the bar may be arrested for any length that is desired; the clutch being thrown into operation automatically by the same gauge. As soon as the cut is made the piece

drops out and the shear blade ascends to its proper position and stops, while the bar is again fed forward and the operation is repeated until the bar is cut to proper lengths.

Before placing the machine on the market the makers gave it considerable practical service in the Cannonsburg Iron & Steel Company's works, which have afforded every facility for making practical tests by which the machine has been perfected. The machine is offered in any desired capacity and the makers present it to the trade with every confidence that it will meet with unqualified approval. It is built by the E. W. Bliss Co., of Brooklyn, N. Y.

#### Test of a Worthington Pump.

In March Mr. F. B. Pelham made to Mr. A. Torrey, Chief Engineer of the Michigan Central, the following report of a test of a Worthington pump at one of the Detroit elevators of that company:

Tests were made with the Worthington steam pump at Elevator "B," with the following results: The valve between pump "A" and "B" was closed; the stockyards were supplied by the stockyards tank, and no water was allowed to be taken from any of the tanks or hydrants between the pump and the high tank at the engine-house. The pump was stopped and the water allowed to settle in the tank. It was carefully measured and the pump was worked at a normal speed for a certain length of time. Measurements of the water were again taken; then the speed of the pump was increased to the ordinary maximum and the amount of water delivered into the tank at that speed also measured. Owing to the inconvenience caused to the operating department in cutting off the supply from the standpipes the tests were limited to one and one-half hours. No indicator diagrams were taken, and no leakage tests were made. The leakage, however, may be considered merely nominal.

#### Summary.

Length of pipe from pump to tank . . . . .	16,800 ft.
Diam. of pipe (delivery) . . . . .	8 in.
Length of pipe (suction) . . . . .	140 ft.
Diam. of pipe (suction) . . . . .	12 in.
Diam. steam cylinders . . . . .	18½ in.
Diam. water plungers . . . . .	10½ in.
Length of stroke (nominal) . . . . .	10 in.
Elevation of water (Detroit River), 2 p. m., March 5 . . . . .	92.40
Elevation of centre of pump . . . . .	105.05
Elevation of bottom of tank . . . . .	138.83
Elevation of water in tank (2 p. m.) . . . . .	149.45
Pressure (gauge reading) still water at pump . . . . .	22 lbs.
Average reading pressure gauge at pump (normal speed) . . . . .	52 lbs.
* Average reading vacuum gauge at pump (normal speed) . . . . .	5 lbs.
Vertical distance between gauges . . . . .	4½ ft.
Normal piston speed (average per min.) . . . . .	45½ strokes
Delivery into tank per min. . . . .	322 gals.
Average reading pressure gauge (ordinary max.) . . . . .	68½ lbs.
Elevation water in tank . . . . .	151.00
Average piston speed per min. each . . . . .	60 strokes
Delivery into tank . . . . .	4.28 gals. per min.

\* Vacuum gauge readings taken with difficulty and are to be considered only approximate.

Readings were also taken at West Detroit by pressure gauge (distance from pump, 13,400 ft.; elevation, 114.40 ft.) when pump was running at a normal speed, and the average was 26 lbs.

The total loss of head due to friction, including loss at the pumps, is:

At normal pressure about 74.0 ft.  
" max. " 109.5 ft.

This amount distributed over the total length, 16,800, is 4.40 ft. and 6.52 ft. per 1,000 ft. respectively. For an 8-in. pipe without bends, etc., Fanning gives 2.32 ft. and 4.04 ft. for the same volume of flow, and Trautwine 2.63 ft. and 4.36 ft.

#### Shop Map of the Missouri Pacific.

A map of the Missouri Pacific Railway was recently prepared in the office of J. W. Way, Chief Engineer of the road, which has been found to be of great use and convenience to the operating and mechanical departments. The total mileage of the road is 5,375 miles. The road is equipped with 606 locomotives, 483 passenger cars, and 22,222 freight and miscellaneous cars. There are many round houses, machine shops, turn tables and Y's, and it was for the purpose of indicating clearly and compactly the location of such buildings and their directions and distances from different points on the road that the map was prepared. A small part of the map is here reproduced as a sample of the whole.

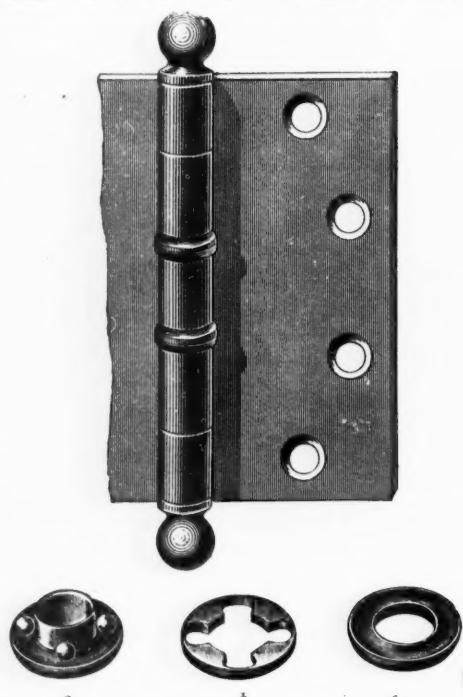
The map is about 20 inches square, and on it are shown all stations at which there is either a round house, turn-



table, machine shop, or Y, and also the junction points. The lines indicating the roadway are generally straight between any two stations, but the direction of the line represents the general direction of the railroad between the two points. The distance between any two adjacent stations mentioned above is also given. A round house is indicated by a circle, a vacated round house by a circle with an X in it; a round house containing machine tools is indicated by a circle with the letter M in it; shops by a small square, a turn table by two T's, and tracks which take the place of a turn table by the letter Y. By this arrangement a good deal of information is presented in a compact form.

#### The Stanley Ball-Bearing Butt.

A ball-bearing door-hinge; why not? No squeaking of the door, no working up of the pin, no greasy butt coated with dust and lint, no wearing down of the butt



and rubbing on the threshold, no crowding and pushing to open the door; compact, simple and cheap. Surely it is a very appropriate use for ball-bearings. The engravings show the whole thing in a nutshell: *a* is a steel plate washer, *b* the guide, *c* the cover, and *d* is the whole bearing washer placed between the two parts of the butt. These washers may be applied to any of the best finished butts of the Stanley Works, New Britain, Conn., who are the patentees and manufacturers.

#### English Railroad Companies as Street Carriers.

An important department of English railroad business, which has no counterpart in the United States, is the work which the roads do in connection with the collection and delivery of freight, especially at their termini in London and other large towns. In the streets of London alone the number of horses employed in cartage work by the railroad companies has been estimated at 6,000; while on its whole system the London & Northwestern finds work for 3,700. A great many of these, however, are not the property of the road itself, but belong to Messrs. Pickford & Co., the old-established carriers, who in London and many other towns act as Northwestern carting agents. All the other leading roads, however, do their own street cartage work, and in this matter some figures furnished to the writer by the Great Northern Company may be taken as an average representation of what this branch of business involves, at any rate on the Northern or heavy lines. In round numbers the Great Northern road owns 2,000 horses. Of these about 1,500 are employed in carting heavy goods, 200 draw light parcel vans, 160 do switching work (in which, however, they are being more and more superseded every year by the use of hydraulic capstans), 50 are employed to horse the omnibuses which the company lets out on hire to convey passengers to and from its termini, about another 50 do odd jobs of various kinds, while the remaining 40 are "seasoning"—that is to say they are new horses, which are being gradually accustomed to their future duties. The average price given by this company for a dray horse is \$300, and for a switching horse \$400, while the maximum reaches \$500—figures, by the way, which are just about double those paid thirty years ago. Such has been the benefit done to the horse-breeding industry of England by those very railroads which at first were regarded as its deadliest foes. Taking the average value of the 1,750 animals employed by the Great Northern Company in cartage work as \$250, we find that that road has over \$430,000 invested in horseflesh for its freight business, not to mention the drays and vans which are probably worth quite as much. The original cost of the animals, however, is by no means the only serious item of expenditure which this extensive street cartage business involves. The horses must be housed in situations handy for their work, and this has necessitated the erection by the roads in London and other great towns of large stable buildings on very expensive sites. The preparation and storage of the provender for these large studs of horses is another department involving considerable outlay.

Another interesting development of this business is the provision made for the treatment of sick horses. For these animals separate hospital stables are provided in which they are comfortably housed in roomy loose boxes, and can, if there be any fear of infection, be completely isolated from their fellows. In addition to these town hospitals, several of the larger horse-owners among the railroads have provided country convalescent homes, with grazing meadows attached, to which animals are sent for rest as well as for medical treatment. Here complete apparatus is provided for giving Turkish baths and other hydropathic treatment to the invalids. All these various items contribute to swell the expenses of the roads as horse-keepers. Taking everything together—provender, bedding, wages of stablemen, loftmen and clerks, machinery, shoeing, medicine and hospital expenses and stable rent, and allowing 20 per cent. for depreciation of value on horse and harness—for the average "carrier" is worn out after five years on the London pavements—the weekly cost of each horse in a railroad company's stud works out at rather over \$6. This for 52 weeks and 1,750 horses, gives the respectable annual expenditure of nearly \$550,000 by one road on horseflesh for street cartage work.

It will be interesting to inquire into the growth of the system and to ascertain how it has come about that the roads have taken upon themselves so large an undertaking, separate from, though subsidiary to, their proper operations as carriers by rail. The clue to this, as to many other peculiarities of the English railroad system, lies in the fact that its organization gradually shaped itself out of the arrangements which prevailed when the public highway and the canal were the regular channels of traffic. In England the ironway, as a rule, merely superseded less convenient modes of communication. In the pre-railroad days, thanks mainly to the enterprise of Messrs. Pickford & Co., a well-organized system of freight distribution by means of canal-boats, carriers' carts, pack-horses, etc., existed throughout all the more populous parts of England, and this system—a main feature of which was that it was a door to door system—has been the foundation on which future developments have been built up.

As railroads were constructed, the already established carriers made use of them as they found them convenient, paying toll to the railroad companies for use of the rails, as they were already accustomed to pay the canal companies for use of the water-way, and when the steam engine came into common use, paying also for the hire of locomotive power, even when the railroad companies took into their own hands complete control of all traffic that passed over the lines, and became for the most part the owners of the wagons as well as the engines, the carriers still kept them in quite a subsidiary position with respect to the shippers. It was still Messrs. Pickford, Chaplin & Home and the other carriers who fetched and delivered, loaded and unloaded, insured and were paid for the freight, which they merely handed over to the railroad companies for rail carriage as was convenient, collecting it again at the end of its train journey and conveying it in their carts to its actual destination.

As the railroad system developed it was obvious that if the companies were to establish themselves as carrying companies independent of the existing carriers, it could only be by offering to the public the same facilities which were already given by the established firms. In other words, they must organize a door to door system of conveyance, collecting and delivering freight at each end of its journey. In order to do this, however, they had to obtain an extension of their powers from Parliament. An agitation was accordingly set on foot and the matter engaged the attention of Select Committees of the House of Commons in 1839 and 1840. The committee of 1839 declined to express an opinion in favor of either of the two systems till further experience was gained. But the committee of 1840 arrived at a decided opinion. They declared against the views of the carriers, and held that the railroad companies should not be prohibited from collecting and delivering goods at their termini. Consequent on this decision there was a struggle for a few years, followed in the course of nature by the survival of the fittest. In some cases the carriers prudently came to terms with the railroads, and—as in the case of the London & Northwestern and Messrs. Pickford—have continued to do the bulk of the street cartage work. But the position of the parties became now the reverse of what it was formerly. The railroad companies were now, in the bulk of the transactions, the responsible carriers having the direct dealings with the shippers. The old carriers soon fell into a subsidiary position similar to that in which they themselves had formerly kept the railroads, while the latter became in the majority of cases their own street cartage agents, developing by degrees the extensive machinery for this purpose with which we dealt in the early part of this article. Such in brief is an account of the growth and present extent of the business done by English railroad companies as street carriers.

Signs are not wanting, however, that the present system is likely to undergo considerable modification in the near future. The main difference in tendency between the English service, which is from door to door, and the American, which is from station to station, is that the one is most favorable to a retail and the other to a wholesale mode of doing business. When touching upon this very point in his work on "The Railways and the Traders," Mr. Aeworth remarks that "the English farmer still looks upon the railroad train as only a slightly magnified carrier's cart." This is natural enough, because it is with "a carrier's cart"—only "magnified" in the sense that its calls are more frequent and its service more expeditious than of old—that the railroad company presents itself at the warehouse or farm of the English trader. Consequently, while the American shipper must in many cases send a carload consignment or send nothing at all, the Englishman has facilities actually pressed upon him for sending his freight in small consignments. [The American shipper can send as small consignments as he chooses. It is merely a question of the rate. Sometimes, in competitive business, he cannot afford to ship in less than car load lots.—EDITOR.] Still, on the other hand, the English railroads do grant lower rates for traffic in larger quantities, and also, though the bulk of their rates are what is called "C. and D." rates, i. e., they include collection and delivery, yet in all cases where this is so, what is called a "cartage drawback" is allowed to shippers who perform their own street carriage at either end of the journey. Under the encouragement of these two concessions, and in harmony with the spread of wholesale methods of business, which is a marked feature of modern commercial progress in England, an increasing number of shippers, especially those in a large way of business, now make it a rule to cart their freight to the railroad depots. Under these circumstances the system of charging such traders the full rate, including cartage, and subsequently allowing them a drawback of a fixed sum per ton, is every year being felt to be a more cumbersome one, involving the railroad companies in much unnecessary clerical expense. Moreover, in the process of reduction of rates, instances inevitably arise where the amount allowed for cartage drawback is quite out of proportion to the whole sum charged, and indeed a story was recently circulated that on a leading road a rate was discovered of which the total is actually less than the amount refunded to the shipper for cartage performed by him. Under these circumstances it seems not unlikely that a system analogous to the American one of quoting what are called in England "station to station" rates as the standard charge, and making cartage an extra, may become common in the near future, and indeed it has already been introduced in a considerable number of cases, especially for traffic which passes regularly and in large quantities. And it is precisely this class of traffic which seems likely to rapidly develop in the United Kingdom, as shippers grow out of methods of business which properly belong to an era of slow communication and realize how great in the present day are the advantages of wholesale dealings.

Such a separation as is here suggested between the business of street collection and delivery, and the working of the freight on the rails would, if carried out extensively, have this practical advantage, that it would enable the railroads to form an estimate of their earnings from cartage work which they could set against the large expenditure under that head which has been detailed. This is especially desirable because it is on the alleged wasteful competition in connection with the collection of freight that the charges of extravagant management so frequently made against English railroad companies, are most commonly based.

Particularly are these complaints raised against the receiving houses, which the English roads, urged on by the force of competition, have established in London and other great towns. These receiving houses, though they are sometimes miles from the railroad, practically act as subsidiary stations, goods and parcels being taken in at them to be subsequently carted to the railroad stations. Moreover, as they are almost without exception established in the busiest streets of large towns, where rent is enormous, the expense of maintaining them is very great. Nor has the establishment of these local depots allowed the railroads to dispense with the door to door collection of freight. On the other hand this seems to be made with more frequency than ever, and often some of the most-used streets of London are blocked from end to end with competing railroad carts. While admitting that there is a good deal of waste involved in such competition, for which perhaps the shippers have to pay in higher rates and the railroad shareholders in reduced dividends, it must not be forgotten that the English system gives a freight delivery service incomparably better than anything afforded by other European railroads, and while this is so, it would seem to be to the public interest that the roads should continue to act as street as well as rail-carriers.

C. H. G.

**The Decline of the Laird Crosshead.**

Occasionally locomotive designers have to retrace steps taken apparently in advance. This is the case with those who assisted in the Laird crosshead movement several years ago. At present there is a decided movement to drop that design of crosshead, for large and medium sizes of locomotives, as being impracticable. The piston-rod breakages with the Laird crosshead as it has been constructed are among the most annoying and troublesome defects in recent locomotive construction. Some roads are going so far as to change the crossheads to more serviceable types on existing locomotives, and there is a wide tendency to discard the type on all future designs. The cause of the breakage is simple enough, and it is hard to understand why recent designers, particularly of locomotives shown at the World's Fair, have increased the evil by using clumsy and ugly varieties of the Laird type.

Perhaps the following examples are better than argument to show the actual harm of carelessly changing designs, and adding to the dead weight of reciprocating parts of locomotives, without studying beforehand the inevitable results. Fig. 1 shows one of the earliest forms of the Laird crosshead. It was made very light and of wrought iron. Fig. 2 shows what the Laird crosshead has grown to be, after the addition of increments of mass put on by thoughtless draftsmen. The weight of the first, Fig. 1, is about 195 pounds; the weight of the second, Fig. 2, made of cast steel, is about 340 pounds.

The effect of the large lop-sided mass at A is to produce a binding strain on the piston rod at B when the crosshead is being stopped, or started from rest, at the end of the stroke. Let us take an actual case, say Fig. 2. The inertia of the mass A at high speed produces an ultimate fiber stress of 11,500 lbs. per square inch on the surface of the piston rod at B. This stress is reversed in direction twice every revolution or in the neighborhood of ten times per second. The experiments of Wohler and others on the fatigue of metals, have shown that no material known to mankind can stand the reversal of so great a stress for an indefinite time, and breakage must occur sooner or later as indicated by a purely analytical examination. With these conclusions the practical results agree; the breakages occur exactly where the theory indicates.

The contrast between the bad design shown in Fig. 2, which has been the result of careless changes of the original Laird crosshead, with the centrally located and equally balanced type of Fig. 3 and similar designs, is very great. In Fig. 3 there is no overhanging mass to produce a bending action on the piston rod, hence the better results and the less number of piston rod breakages found.

**Railroad Matters in Chicago.**

**Freight Traffic**—The volume of grain and miscellaneous traffic furnished by farm products from the interior continues to meet the anticipations of the managers of railroads, the aggregate deliveries by the ten Granger lines the past week being 60,095 barrels of flour, and 3,190,000 bushels of grain, compared with 94,830 barrels of flour, and 2,758,000 bushels of grain the week ending April 28, and 87,117 barrels of flour, and 2,281,009 bushels of grain the first week in May, 1893. The live stock traffic also

compared favorably, the deliveries including 51,782 head of cattle, 123,600 hogs, and 54,692 sheep, against 60,891 cattle, 106,300 hogs, and 65,900 sheep the same week last year.

But the roads traversing the coal mining districts in Illinois and the States west of the Mississippi are suffering from the strikes of miners, and the amount of coal moving is steadily decreasing as the surplus supplies at the mines are absorbed. The curtailment of the coal supply is also compelling the closing of manufacturing establishments at interior points, and a restriction of work at others, therefore the freight is materially reduced. As this class of freight generally pays good rates the loss to the roads is serious. The Chicago lines having divisions in the iron belt of Wisconsin, Minnesota and Michigan, and especially the Chicago & Northwestern and the Wisconsin Central, are also feeling the adverse effects of strikes among miners at nearly all the leading iron mines. The interior lumber traffic, while showing some improvement, is much less than dealers anticipated, the decrease being due in the main to restricted building operations at leading Western points largely because of labor troubles. There is no improvement to note in the volume of outbound freight from Chicago to the interior; on the contrary the majority of roads complain of a decrease. The chief causes of the shrinkage are found in the labor troubles, and the fact that the bulk of the spring trade is over, therefore shipments of merchandise are necessarily decreasing. It is gratifying to be able to state that reliable information from the agricultural districts is of the most favorable character. That the winter wheat belt, with scarce an exception, represents a marked improvement in the prospects for a large crop, and the outlook for nearly every description of other crops is good. The area seeded promises to be the largest in the history of the West.

The deliveries of grain at Chicago by the leading Western railroads for the week ending May 5, and the same time the two preceding years, compare as follows (bushels):

	1894.	1893.	1892.
	Grain.	Grain.	Grain.
C. & N. West.	707,000	319,000	322,000
Ill. Cent.	307,000	445,000	238,000
C. R. I. & P.	446,000	20,000	345,000
C. B. & Q.	615,000	724,000	877,000
C. & Alton.	186,000	85,000	162,000
C. & E. Ill.	41,000	21,000	76,000
C. M. & St. P.	448,000	197,000	489,000
Wabash.	155,000	118,000	134,000
C. & Grt. W.	190,000	141,000	141,000
A. T. & S. Fe.	82,000	210,000	245,000
L. N. A. & C.	13,000	1,000	1,000
Total bush.	3,190,000	2,281,000	3,030,000

The following shows the deliveries of flour (barrels) at Chicago by the leading Western railroads for the week ending May 5, and comparisons with the two preceding years:

	1894.	1893.	1892.
	Flour.	Flour.	Flour.
C. & N. West.	1,500	26,532	21,989
Ill. Cent.	600	450	5,275
C. R. I. & P.	16,983	3,450	15,749
C. B. & Q.	20,020	17,549	5,425
C. & Alton.	5,250	1,200	1,200
C. & E. Ill.	—	600	—
C. M. & St. P.	9,600	18,200	18,025
Wabash.	1,200	1,200	1,915
C. & Grt. W.	4,942	17,536	7,013
A. T. & S. Fe.	—	600	420
L. N. A. & C.	—	—	—
Total bbls.	60,095	87,117	75,911

The following shows the deliveries of grain (bushels) at Chicago by the leading Western railroads for the month of April, and for the same time the two preceding years:

	1894.	1893.	1892.
	Grain.	Grain.	Grain.
C. & N. West.	2,468,000	2,047,000	1,313,000
Ill. Cent.	1,053,000	1,769,000	1,854,000
C. R. I. & P.	1,490,000	119,000	1,468,000
C. B. & Q.	1,689,000	5,200,000	2,617,000
C. & Alton.	531,000	201,000	641,000
C. & E. Ill.	130,000	290,000	249,000
C. M. & St. P.	1,859,000	1,456,000	1,747,000
Wabash.	778,000	227,000	361,000
C. & Grt. W.	316,000	761,000	424,000
A. T. & S. Fe.	627,000	636,000	671,000
L. N. A. & C.	57,000	4,000	2,000
Total.	10,998,000	12,710,000	11,347,000

The deliveries of flour (barrels) at Chicago by the leading Western railroads for the month of April, and for the same time the two preceding years, compare as follows:

	1894.	1893.	1892.
	Flour.	Flour.	Flour.
C. & N. West.	75,139	94,271	106,412
Ill. Cent.	450	6,750	4,905
C. R. I. & P.	64,419	7,650	20,600
C. B. & Q.	52,972	69,924	70,131
C. & Alton.	15,150	3,848	15,450
C. & E. Ill.	2,350	600	250
C. M. & St. P.	141,275	107,900	90,945
Wabash.	1,229	3,791	4,841
C. Grt. W.	76,632	50,372	63,959
A. T. & S. Fe.	—	1,650	612
L. N. A. & C.	—	150	—
Total.	429,616	346,906	378,105

The deliveries of live stock at Chicago by all the railroads for the month of April and for the corresponding time the three preceding years, compare as follows:

	1894.	1893.	1892.	1891.
A. T. & S. Fe.	883	836	985	1,021
B. & O.	11	9	11	6
C. & Alton.	1,036	2,023	1,183	1,041
C. B. & Q.	5,540	4,197	5,153	4,550
C. & E.	11	6	13	7
C. & E. Ill.	264	245	227	196
C. & Gd. Tr.	20	9	11	10
C. M. & St. P.	3,953	2,728	3,277	2,899
C. & N. West.	5,346	3,892	5,146	4,109
C. R. I. & P.	2,818	2,205	2,951	2,249
C. & Grt. W.	643	474	686	968
III. Cent.	2,160	1,555	2,029	1,481
L. S. & M. C.	72	24	21	21
L. N. A. & C.	91	68	78	30
Mich. Cent.	36	20	24	24
N. Y. C. & St. L.	16	15	4	11
P. C. C. & St. L.	32	30	25	38
P. Ft. W. & C.	12	11	19	17
Wabash.	807	1,371	715	810
Wis. Cent.	125	126	117	78
Total cars.	23,876	19,844	22,675	19,566

The following table is presented to show the different class of live stock delivered at Chicago for the first four months of the years named:

Receipts.	Cattle.	Hogs.	Sheep.
1894.	948,695	2,592,850	1,039,654
1893.	995,098	1,810,749	888,770
1892.	1,070,398	2,843,427	688,707
1891.	942,256	3,387,563	794,623
1890.	1,022,431	2,373,319	702,181
SHIPMENTS.			
1894.	326,983	916,692	78,113
1893.	308,245	784,029	130,485
1892.	418,099	1,193,543	168,705
1891.	347,315	1,233,952	325,733
1890.	487,440	720,903	297,773

The shipments of live stock from Chicago by the East bound railroads for the month of April for the past four years compare as follows:

	1894.	1893.	1892.	1891.
B. & O.	395	473	708	443
C. & Erie.	788	206	366	326
C. & Gd. Tr.	1,548	970	1,160	935
L. Shore.	2,273	1,915	2,091	1,930
Mich. Cent.	515	810	721	765
N. Y. C. & St. L.	329	337	1,732	1,419
P. C. C. & St. L.	98	133	195	89
P. Ft. W. & C.	1,304	1,015	1,276	1,101
Total Cars.	7,250	5,859	8,249	7,008

**Passenger Traffic**—There is little encouraging to record in passenger traffic. The leading lines state that through travel between Chicago and leading Western points is less than a few weeks since. Increasing distrust as to the business situation since the commencement of labor troubles seems to operate adversely on travel between leading business centres. Interior local traffic is also moderate. General managers and passenger agents when interviewed regarding the outlook for summer travel appear to entertain very conservative ideas. They as a rule say there is little to indicate an early improvement. They anticipate a light business until autumn, and will shape their train service to conform to it. In this way they hope to bring operating expenses for such service within the receipts. The passenger agent of one of the through lines to Denver when asked if his road had restored the dining cars on the trains from which they were withdrawn some time since, replied that they had not, because the patronage was so poor that the receipts would not pay a moderate charge for hauling them, and the expense of maintaining the tables was a dead loss; and his road was not disposed to throw away money merely for empty show. Officers of other roads made like statements.

**Wages**—The heavy falling off in the coal and other interior tonnage since the commencement of the strikes at the mines is causing the managers of some lines to seriously consider a reduction of wages as an offset to the loss of tonnage, while others have decided that the most judicious course will be to lay off employees. Referring to the proposed wage reduction on the Louisville, New Albany & Chicago, General Manager McDowell said, "Our business has suffered severely from the trade depression and labor troubles. Our coal freight from the Indiana mines is practically nothing. We were also paying a higher average to the majority of our men than even a good active business warranted. It was therefore positively necessary to make the proposed reductions, and I do not look for any trouble from the men, a majority of whom I think will appreciate the situation."



## EDITORIAL ANNOUNCEMENTS.

**Contributions.**—Subscribers and others will materially assist us in making our news accurate and complete if they will send us early information of events which take place under their observation, such as changes in railroad officers, organizations and changes of companies in their management, particulars as to the business of the letting, progress and completion of contracts for new works or important improvements of old ones, experiments in the construction of roads and machinery and railroads, and suggestions as to its improvement. Discussions of subjects pertaining to ALL DEPARTMENTS of railroad business by men practically acquainted with them are especially desired. Officers will oblige us by forwarding early copies of notices of meetings, elections, appointments, and especially annual reports, some notice of all of which will be published.

**Advertisements.**—We wish it distinctly understood that we will entertain no proposition to publish anything in this journal for pay, EXCEPT IN THE ADVERTISING COLUMNS. We give in our editorial columns OUR OWN OPINIONS, and those only, and in our news columns present only such matter as we consider interesting, and important to our readers. Those who wish to recommend their inventions, machinery, supplies, financial schemes, etc., to our readers, can do so fully in our advertising columns, but it is useless to ask us to recommend them editorially, either for money or in consideration of advertising patronage.

The office of the Railroad Gazette is now at 32 PARK PLACE, New York.

The Lake Shore, naturally, shows a course of passenger earnings last year similar to that on the Michigan Central, which we noticed some time ago (Feb. 9, page 109). That is, in the first four months of the year there was little change, followed, after the opening of the World's Fair, by large gains, which in the last two months of the Fair became enormous. During the six months of the Fair the passenger earnings increased from \$2,961,403 in 1892, to \$4,705,924 in 1893, a gain of \$1,744,521, or 58 per cent. The gain is very nearly the same in amount as the Michigan Central's (\$1,721,218, or 68 per cent.). In November and December the Lake Shore had a decrease of \$144,530 (16½ per cent.) in passenger earnings. The Lake Shore is one of the few railroads which reports its through business separately. Of the gain in passenger mileage last year, 59 per cent. was in through travel; yet the through travel was but 31 per cent. of the total travel. On the Michigan Central the gain in through passenger travel was 80 per cent. of the total gain, and the through travel was 41 per cent. of the total travel. Further, on the Michigan Central, in spite of cheap World's Fair tickets, the average through passenger rate was considerably higher in 1893 than in 1892 (1.906 cents per mile against 1.796 cents); and the increase in through passenger earnings was no less than \$1,343,573, or 151 per cent.; which, by the way, is \$313,000 more than the dividends for the year. On the Lake Shore there was a very small decrease in the average through passenger rate, leaving it, however, still a little higher than on the Michigan Central. The Lake Shore's gain in through passenger earnings was \$355,000 less than the Michigan Central's, but its gain in local passenger earnings was \$382,000 greater. The figures are so interesting that we copy some of them:

	1893.	1892.	Inc.	Per ct.
<i>Local—</i>				
Michigan Central . . . . .	168.6	152.9	15.7	10.3
Lake Shore . . . . .	230.7	194.8	35.9	18.4
<i>Through—</i>				
Michigan Central . . . . .	117.2	50.4	66.8	132.5
Lake Shore . . . . .	103.5	53.0	50.5	95.2
<i>Passenger Earnings:</i>				
<i>Local—</i>				
Michigan Central . . . . .	\$3,835,693	\$3,604,985	\$2,0708	6.4
Lake Shore . . . . .	4,916,923	4,303,828	613,095	14.2
<i>Through—</i>				
Michigan Central . . . . .	2,234,188	890,615	1,343,573	151.0
Lake Shore . . . . .	2,076,137	1,087,557	988,580	90.9

The Lake Shore counts as through passengers only those between Buffalo and Chicago; whether the Michigan does, we cannot now say. If it includes Detroit-Chicago passengers with the through, the figures are less surprising. But for both roads, evidently, the through travel was an extremely important matter last year, when the gain came just as it was most needed.

Probably no railroad company felt the effect on travel of the World's Fair more than the New York, Chicago & St. Louis. This is all main line, and what is more to the purpose, its passenger business, in ordinary years, is light compared with that of the adjacent Lake Shore & Michigan Southern or the parallel and more distant Michigan Central. The Lake Shore for three years previous to 1893 averaged 240 millions

of passenger miles yearly on 1,445 miles of railroad, probably three-fourths of it on the main lines between Buffalo and Chicago. The New York, Chicago & St. Louis meanwhile averaged 29 millions of passenger miles on its 512 miles of road; and the Michigan Central 200 millions on its 1,619 miles, only one-third of which is main line. This is equal to a movement each way daily over the whole mileage of 227 passengers on the Lake Shore, 169 on the Michigan Central, and 79 on the New York, Chicago & St. Louis. Compared with the main line travel alone of the other two roads, the last named of course would take a much lower place. Now in 1893, the Michigan Central's travel increased over the previous year 82½ millions of passenger miles (40 per cent.), the Lake Shore's 86 millions (35 per cent.), and the New York, Chicago & St. Louis's 70 millions, or 200 per cent. The average daily movement each way increased by 214 on the latter, by 82 on the Lake Shore, and by 69 on the Michigan Central. Doubtless the gain in local travel was greater on the last two roads than on the New York, Chicago & St. Louis; but the latter was the route for the cheapest, through, World's Fair tickets for the West Shore and some other Eastern roads. Certainly a gain of 200 per cent. in one year, made doubtless nearly all in six months, is a notable one.

The New York, Chicago & St. Louis Railroad has developed a freight traffic which gives it a more than respectable place among the "trunk line connections." Last year (when its freight business was the highest for four years), its ton-mileage was only about one-fourth less on its 512 miles of road than the Michigan Central's on 1,634 miles of road, though not two-fifths of the Lake Shore's. The freight traffic of these three railroads was equivalent to a movement each way daily over the whole mileage, of 1,137 tons on the Michigan Central, 2,295 on the Lake Shore, and 2,528 on the "Nickel Plate," to comprehend which we must remember that the latter is all main line.

The Chicago, Burlington & Quincy passenger earnings are especially interesting as the only ones reported monthly by a Chicago railroad. We have noticed heretofore how, after being greatly swelled by the World's Fair last year, and for November afterwards, they began to fall off largely in December. Since that month the decrease has continued, and for the first three months of this year the passenger earnings were just one-sixth less than last year, the freight earnings meanwhile having decreased 19.2 per cent. The largest decrease in these earnings was in March (21½ per cent.). Passenger traffic in all probability would have fallen off largely after the Fair even if times had been prosperous, as a great many people during the Fair did all the traveling they could afford for some time. We have now arrived at the time when earnings were swelled last year by the Fair travel, and consequently we must expect to see the decreases of the Chicago roads become greater than they have been recently, which, to the unobservant, will probably be taken as a sign that business is growing worse, while it will be due actually to the improvement of business last year. Freight traffic did not begin to decline last year until June, and not very seriously till July. When these months arrive, the railroads, especially those far from Chicago, may show as large earnings as last year and still be having a very bad business.

One of the anomalies in railroad service constantly before the eyes of everyone interested, is the great care taken to enforce with scrupulous exactitude the rules requiring money to be accounted for, while rules made to promote the safety of passengers and trainmen are too often left to enforce themselves. A conductor on a prominent road calls attention to this in a letter which we print in another column. It is fair to assume that this letter is based on what the writer sees in his own experience; and as his road is one of the best disciplined in the country we may safely conclude that on the "average" road the need of improvement is still more marked. We surmise that this conductor is one who gives excellent service himself, and who, therefore, sees with a true eye the short-comings of his less experienced or less able comrades. It will always be easier to correct bad practice in making reports or counting money than to inculcate vigilance in watching for signals and politeness in dealing with disagreeable passengers, for the former is an exact science, while the latter depends largely on the temperaments of the employees dealt with or their varying surroundings; but every one knows that there is room for much improvement, and we print the letter as a reminder that thoughtful observers are not forgetful of the true state of affairs even though criticisms or complaints are not always coming to the surface. The need of more systematic and thorough inspection in

the train and station service was set forth in strong language by Col. H. S. Haines, President of the American Railway Association, in his paper on Railroad Accidents, at the World's Railway Congress last June. He said:

Railroad managements are themselves open to censure for inefficient supervision of train service. They have the lesson to learn which centuries of experience have taught to the creators and leaders of military organizations: that it is one thing to give an order and another thing to see that it is enforced. Close inspection insures efficiency of appliances, of regulations and of discipline, and this is greatly lacking even on the best railroad systems in this country. Money expended in salaries for men to do nothing else but see that rules are observed is looked upon as wasted. What is wanted is not spies or detectives, but a staff of inspectors reporting directly to the General Manager outside of any department official. This is what is done in armies, and the positions are held in honor and filled by the best men on the General's staff. With such a system of inspection the management does not have to wait for a bridge to fall down to learn that it was rotten, or for a score of lives to be lost in an accident to know that train rules were habitually disregarded.

An important point brought out in the letter referred to in the foregoing is that employees often do not feel free to tell the superintendent all they know or think about the needs of the service. And yet every fair minded superintendent knows that he often gets instructive points from his conductors and other subordinates, and we therefore suggest that this letter be copied and kept as a reminder that trainmen know something of the demands that they ought to make, even if they do not feel warranted in presenting them. A superintendent, busy with business-like demands such as those here presented, will be better prepared to repel the unbusiness-like demands so often made by grievance committees. It is gratifying to see that the standard set forth by Col. Haines, though so high that, as he says, it is almost universally ignored, is not entirely lost sight of. A prominent Western road not long ago doubled its force of trainmasters, or, rather, appointed assistant trainmasters, so as to permit the assignment of officers of this grade to duty out on the road. The traveling engineer, who is chiefly an inspector, is, we believe, slowly growing in favor. Prevention is better than cure, and every move looking to a more thorough understanding between officers and subordinates tends to show that this maxim applies here as in other matters; especially when the "cure" is nothing better than suspension.

The holders of the first-mortgage bonds of the South Carolina Railway Company have distinguished themselves by foreclosing their mortgage and actually buying the property at the foreclosure sale without asking the permission of stockholders, second-mortgage bondholders or income bondholders. Theoretically, this has always been possible if the subordinate security-holders did not provide for the prior mortgage; but practically, the holders of shares and inferior liens have usually been able to make the holders of prior mortgages sacrifice anything; sometimes when the shareholders sacrificed nothing themselves. Bondholders are creditors and usually have no desire to own and manage the property which is security for the money they have lent. They are apt to be widely scattered and find difficulty in acting together. Their long-suffering has led people to regard the priority of their lien as theoretical rather than practical, good to help sell the bonds, but not to be enforced to its full extent if inferior liens object. The whole investing public, therefore, owes a debt of gratitude to the South Carolina bondholders for having actually proved that a first mortgage is a first mortgage, which must be satisfied so far as the property covered by it goes. In this case, it will probably go far enough to pay the face of the bonds and the past-due coupons (18 per cent.); whether it will secure the bondholders 6 per cent. for the remaining 26 years the bonds had to run, is doubtful. The important thing is not how much the bondholders got but the fact that they succeeded in enforcing their lien and getting all there was to get. A similar course with a larger company would do much to increase confidence in American railroad securities, which suffer from the conviction, supported by a wide experience, that mortgages do not mean much practically.

A very light-colored head lining is a feature of some of the passenger cars on the New York, New Haven & Hartford, that have lately come out of the shops. These cars are from three to five years old, and have now had their first general renovation. The wood-work, which originally had a dull finish in the natural colors, cherry or mahogany, is now varnished, on the sides, and overhead is painted a cream color, embellished in some cases with stencilled designs in silver. This makes the car much lighter at night and therefore easier to read in. Our friends who furnish good lights for passenger cars will say that with suitable gas and burners any car is easy to read in, but as long as brakemen are careless, and as long as economy is practiced

by a good many people who mean well, but whose judgment is not always exactly right, lights will sometimes be poor. We have seen Pintsch gas lights on cars not a thousand miles from New York, which gave only about half the light they ought to give. From the general mental attitude of the brakemen we have concluded that the excellent little card illustrated in the *Railroad Gazette* of February 2, showing how the flame should always be  $1\frac{1}{2}$  in. wide, has not been circulated so thoroughly as it might be, or that if circulated, it has not been heeded. The value of the light-colored paint was more particularly noticeable, however, in old cars which were evidently deemed too nearly worn out to warrant the substitution of gas apparatus for the oil lamps. In these cars reading by the lamps was before practically impossible. In suburban trains it is not possible to give the best cars to the most critical passengers, and the old ones to the submissive ones, for all the passengers are grumblers, and every train must be up to the mark. It is true that the complaints of many of these people are really based as much on some detail of architectural decoration that is a year or two behind the times, as on the more important questions of light and ventilation, but if a superintendent gives first-class service in such practical things as lights, he can at least have the satisfaction of knowing that the well-grounded complaints are being abated. We are not sure but that a light interior is a good thing even with the best of illumination. It permits the car to be well lighted with less gas, and the main objection is that it shows dirt. But as cars have to go to the shop after a limited time, in any event, for renovation in other parts, it may be that white would not be much more expensive than darker colors, if extravagant decoration were not indulged in.

#### A Philadelphia Ship Canal.

The other day a meeting was held in Philadelphia to promote the building of a ship canal between the Delaware River and Raritan Bay, to give Philadelphia a direct outlet to the sea by way of the harbor of New York. A resolution was passed requesting the Mayor to recommend to the City Council the appropriation of \$10,000 to make preliminary surveys for such a project, and a committee was appointed to be known as the Citizens' Canal Committee. Certainly the project is worth discussing, and it is desirable to collect the information which an adequate survey would yield. At any rate we should like to name a few good men among whom \$10,000 worth of engineering employment might be divided within the next few months. Perhaps, indeed, it might be worth while to spend the many millions that would be required to deepen the Delaware River and to connect it by a ship canal with deep water in Raritan Bay, but the people who go about it should not allow themselves to be misled by glittering generalities to the effect that New York has become great because she has the Erie Canal, or that Manchester is bound to become a great seaport because the ship canal has been built to Liverpool. A hundred things have conspired with the Erie Canal to make New York New York, and it is a very long way between building the Manchester Ship Canal and filling it with sea-going craft.

One of the speakers at the Philadelphia meeting said that before the opening of the Erie Canal, Philadelphia was the first in the list of American cities, and her commercial supremacy was lost when the Erie Canal was opened. She has fallen now to third place. Should the projects be carried out to cut a ship canal across the peninsula of Maryland from Baltimore, and to cut a ship canal through Cape Cod, Philadelphia would sink to the fifth place. The speaker showed, unconsciously, the fallacy of such statements, when he said, "we have a long and tortuous river leading to the sea. Large steamers require three tides to get to the city." Exactly so, and largely because Philadelphia is so situated, and because ocean-going steamers can sail right up to the docks of New York without going through a ship canal or a river, New York came to be the first commercial city of the continent and Philadelphia lost its prestige.

While a ship canal might be of great value to Philadelphia we should not like to base upon it such sanguine expectations as the citizens who met there the other day seem to have. So far as ocean-going commerce goes, it would appear to be immensely more practicable to improve the Delaware below Philadelphia and establish a direct European commerce that way; and yet the experience of the past has not been such as to encourage people to spend very much money in that enterprise, far less costly than improving the Delaware above Philadelphia and building a ship canal to the Raritan Bay. Time and again the experiment has been tried of establishing a line from Philadelphia to a British port, and the records of those efforts are available for the study of those who are

asked to invest in a new route. The proposed Baltimore ship canal would seem to have as much reason for being as the Philadelphia canal; but Baltimore now has a magnificent water-way to the sea and it is hardly probable that ocean-going commerce would work its way into the Delaware Bay, through a ship canal, and so to Baltimore, instead of going around Chesapeake Bay, which gives open navigation right up to the wharves.

Another speaker said, "Philadelphia is the Manchester of America, and may well learn a lesson." If she is the Manchester of America indeed she may well learn a lesson. We believe that it is quite true, as a contemporary says, that there are 40,000 shareholders in the Manchester Canal Co., and there is the pity of it. The shares of the Manchester Ship Canal were issued at £10, and the conditions of subscription were made very easy. The canal was an article of faith with the people of Manchester, and the shares were taken by rich and poor alike, and in all probability the result will be that they will never get directly a cent from the money that they have put into the canal. Doubtless there will be indirect gain, but any direct payment on the stock of the canal is most improbable. Some of the great manufacturers of Manchester who subscribed to the stock of the canal are already getting good dividends in the way of reduced rates, for the canal company has offered great inducements to ships to use the canal, remitting entirely during 1894 the ship's dues for vessels going as far as Manchester. But the earnings from tolls are still insignificant, and the operating expenses will always be considerable. Excellent judges who are on the spot, say that the cost of maintenance will be far beyond what the promoters of the canal project have ever estimated them to be, and the best opinion in Manchester and in London is, that, from the stockholders' point of view, the canal is a colossal failure.

So, we repeat, the Philadelphians had better leave the Manchester Ship Canal out of their consideration and out of their arguments, and confine themselves strictly to the merits of their own special case, and if, after careful examination of the work to be done and its cost, and of the probable traffic to be had, they decide sanely, without local hurrah, to invest their money in such a project, we shall wish them success and help them all that we can. Meantime, it is a public duty to warn them to go slowly. It may safely be said that one of the causes of the universal depression which to-day is felt all over the civilized world, and perhaps in the savage world, too, is the locking up of the world's capital in unproductive enterprises, and among such unproductive enterprises the Panama Canal and the Manchester Ship Canal stand out as great examples. The Manchester Canal may eventually add to the world's wealth, and its banks, from Manchester to Liverpool may, as some Manchester people hope, be a lane of factories; but to-day the \$75,000,000 or \$80,000,000 that have gone into it are earning comparatively nothing.

#### A German Study of American Railroad Finance.

"The Financial and Traffic Policy of the North-American Railroads" is the title of an elaborate article in the January-February number of the "Archiv fur Eisenbahnen" by Dr. A. von der Leyen, an attache of the Prussian Ministry of Public Works and the editor of that periodical. This article has since been published separately in a pamphlet, and coming from a man known as a student of American railroad affairs, doubtless will command attention in Germany. Its purpose may be gathered from the following sentences in the preface.

"When an American, who is acquainted with the financial policy of his railroads, invests his money in their securities, he knows very well what risks he runs thereby. In Germany very many have scarcely any suspicion of it. The German private individual, even if a business man, supposes the security of American railroad enterprises to be nearly the same as that of good German private railroads. For instance, when he buys American bonds, he believes that he owns 'priorities,' while the majority of those dealt in in the German markets are practically nothing more than shares, whose returns suffer severely from the fluctuating rates, the desperate competitive wars of the enterprises; and he thinks that his study possibly may induce some capitalists who hitherto have estimated the value of American railroad securities chiefly by the quotations on the exchanges, or at best according to their bankers' advice, in future to examine more exactly as to their real value, and may teach the German shipper that American rates are not a pattern worthy of our imitation."

In the course of his article the author then describes most of the extremely various forms of bonds and shares which have been issued by American railroad companies, with reference to many of the infinitely various circumstances under which they have been issued, based chiefly on certain American publications, the larger part of which have been written for the purpose of pointing out and condemning abuses in railroad financing and administration. A very large part of this literature is itself founded upon the re-

ports of legislative investigating committees, the purpose of which was to ferret out evil practices, and from which we may expect to learn, not the normal physiological course of the workings of our railroad system, but at best its morbid pathology, which is a very different thing, and, when considered alone, gives a grossly distorted idea of the general course of railroad affairs, which, to a student far from the field, is not corrected by observation of the prevailing healthy activity of transportation functions, which rarely causes remark. To judge our railroad system from legislative reports and the books and articles based on them, is very much like judging of the physical condition of a nation from the people in its hospitals, or of its moral condition from those in its prisons. In all such matters a quantitative as well as a qualitative analysis is necessary to a safe judgment. From some of the accounts of the working of our railroad system, it would seem impossible for business to be carried on in this country; yet nowhere in the world is it carried on more successfully, and its chief dangers are from its too great prosperity, as it were, which leads men at times to extend enterprises unduly, because they are very profitable.

Dr. von der Leyens' account of the financing of our railroads has evidently been largely based on accounts of a state of things which no longer exists. For many years by far the larger part of the additions to our railroad system have been made by old companies, with a large property, which served as security for the new capital raised. The railroad companies which have failed recently are almost all such, as we have lately shown (Feb. 23, page 141), as had incurred obligations on what in favorable years is an undue proportion of their net earnings. It is as unsafe for a railroad as for a man to mortgage nine-tenths of its maximum income. All extensions, etc., made in this way, the companies make largely at the risk of their creditors; and Dr. von der Leyen does a service not only to his investing fellow-countrymen, but to sound finance everywhere, by insisting that he who purposes to buy American railroad bonds should first examine sharply into their merits. This is necessary with our bonds to an extent not known in Europe, where almost everywhere there can be hardly any question as to the security of such paper; and where consequently they may be bought with little danger of considerable loss, without expert investigation. We ourselves are by far the greatest losers by bad American railroad financing, and it is desirable for us as well as for foreign investors that our railroad securities should have in Europe no better reputation than they deserve. But, unfortunately, the bad reputation of some American companies affects to some extent there that of the securities of the soundest companies.

A considerable portion of Dr. von der Leyens' paper is given to a study of American railroad freight rates, to undue reductions in which he is inclined to impute the financial disasters of some companies, not appreciating sufficiently the absolute necessity of very low rates to the existence of traffic in many parts of the country where freight must be carried enormous distances to find a market; which rates, however, with the low cost of transportation on our railroads, generally will support the railroads adequately where they have not been unduly multiplied.

#### The Soft Coal Strike.

The trouble among the soft coal producers is, like so much of the present labor troubles, traceable to the general depression in business. Much the greater part of the soft coal mined is used by factories and by the railroads for making steam. When the volume of business, both manufacturing and transportation, fell off, the effect was felt immediately in the demand for bituminous coal. Then began fierce competition between the different fields and the different mining companies for such trade as was offering. In consequence the price of soft coal at wholesale declined during the winter, until, at present prices, apparently the coal producers are losing money. We say apparently, because if current reports are to be believed, the railroads have shared in the fall in price by granting rebates to the large mining companies. In the soft coal field lying east of the Allegheny mountains, the competition became severe. The mines situated in the northern part of Pennsylvania being credited with a poorer quality of coal than is offered by their southern neighbors, found themselves unable to secure what they considered to be their fair proportion of the orders then obtainable, except by concessions in price. To secure these orders and to recoup themselves, they informed their miners that a reduction of wages was necessary. Against this reduction the miners in this northern field began the strike.

It does not appear that the mining companies whose coal finds an outlet at tidewater in the east have obtained any particular advantage in price because of this closing of the northern mines by the strike. The effect, however, was seen in the greatly increased output of the soft coal mines in other parts of Pennsylvania, in Maryland and

West Virginia, an increase sufficient to balance the closing of the northern Pennsylvania mines. The tidewater business in soft coal is done principally on long time contracts, the transient sales forming but a small proportion of the total quantity sold.

This was the situation in the East until quite recently. As we go to press, however, it is reported that the miners in southern Pennsylvania and Maryland have inaugurated a strike there in violation of their agreement. Representatives of the striking miners in the northern mines have been laboring with their southern brethren, and it seems with success. It has been represented that these Maryland and Pennsylvania miners hold the key to the situation, and that their increased daily output is simply killing the chances of success of the northern miners. It is reported that enough of the former will strike for an advance of five cents a ton in wages to counterbalance the situation.

The Ohio, Indiana and Illinois fields present a different set of conditions. The soft coal of those states does not reach tide water, and the situation there has but little effect upon the soft coal problem east of the Alleghenies which we have just been considering. Stocks of soft coal are reported large at Cincinnati, Louisville and at all the Lake Erie ports, as well as Duluth. The industrial depression has greatly diminished the use of coal in those states as well as elsewhere. To meet the situation, concessions were demanded from the men, which were, in the majority of cases, refused. Until a revival of business shall bring about an increased use of coal, it is probable that the struggle will continue in Ohio, Indiana and Illinois so long as efforts must be made to distribute the inevitable losses upon all concerned in the soft coal trade, whether producers, miners or carriers.

The effect on the freight traffic of many railroads is, of course, very serious, though not many definite reports are published concerning this aspect of the strike. As stated in these columns last week, two coal-carrying roads in Ohio at once reduced expenses 33 per cent. Freight train crews have been suspended on the Lake Shore & Michigan Southern, on the Erie, and on the Pennsylvania. At Harrisburgh, Pa., last week, on the latter road, fifty crews were idle, and the dulness in the great freight yard there was very noticeable. Some manufactoryes were compelled to stop work in Central and Eastern Pennsylvania, thus diminishing general freight traffic as well as coal traffic on many railroads. Pittsburgh coal dealers ordered boats at Cincinnati to be towed back to Pittsburgh with their loads. The railroads are accused in many places of taking for their own use cars of coal in transit for outside consignees.

#### Illinois Anti-Scalping Law Declared Constitutional.

The Illinois scalpers had a surprise last week in the decision handed down by the Supreme Court of that State upholding the constitutionality of the Illinois statute entitled "An Act to prevent frauds upon travelers and owner or owners of any railroad, steamboat or other conveyance for the transportation of passengers," popularly known as the "anti-scalping" law.

The decision was in the case of George Burdick, arrested at Carbondale for selling two tickets over the Illinois Central to one Myers, an Illinois Central employee, Burdick not being an agent of the company. He was convicted in the Circuit Court for Jackson County and took an appeal to the Supreme Court. The decision just handed down by Justice Magruder, is concurred in by his associates, and affirms the decision of the lower court.

It was contended by the counsel for the defendant that the act of legislature in question was unconstitutional for the following reasons: (a) It impairs the obligations of contracts. (b) It deprives the person of property without due process of law. (c) It abridges the privileges and immunities of citizens of the United States. (d) It interferes with interstate commerce. (e) It falls within the well-established definition of special legislation. (f) It creates a monopoly.

The Supreme Court held that none of these points was well taken, and further that this act of legislature was a wise and proper regulation of the sale of railroad tickets, and that such an act was and is now required in order to prevent the commission of innumerable frauds upon the public and railroad companies.

It was also contended by the defendant that if a person had a certificate of authority from any railroad company to sell tickets, such certificate under the act in question authorized him to sell the tickets of any company. This question was not considered of sufficient importance by the court to be touched upon. It may, however, afford a loop-hole for bringing up the question in another form when occasion arises.

This is the first decision sustaining the constitutionality of this law. In October, 1892, indictments were returned at Chicago against Messrs. List, Frank, Geis, Stout, Schieley and Yunger—all well known brokers in that city. They subsequently surrendered themselves to the sheriff and habeas corpus proceedings were taken at Chicago before Judges Tuthill, McConnell and Dunne, sitting together. A decision was handed down April 26, 1893, and the relators were discharged on the ground that the indictments were faulty in that in the opinion of the court, the law authorized a person having a license from any road to sell its tickets to sell the tickets of any other road as well, and the indictments in the case averred that the defendant sold a ticket over a particular line, not being authorized by that line to sell its tickets, but in the opinion of the court

it did not follow that each of the defendants might not have been authorized by some other road to sell tickets. At that time it was the opinion of many able lawyers that this decision was faulty in that this point was not well taken; that the intent of the law was misinterpreted.

The Illinois scalper law was passed April 19, 1875, and provides that all authorized agents of common carriers shall hold certificates from the company, setting forth their authority, that all common carriers shall furnish such certificates. The penalty for a violation is a fine not exceeding \$500 or imprisonment not exceeding one year, or both, for selling without license. It further provides for the redemption of unused tickets or portions of tickets, with a penalty of \$500 for refusal.

The members of the American Ticket Brokers' Association were greatly surprised at the decision, but profess to make light of it, claiming that it came out of an ex parte and collusive case, and that they can get the decision reversed. It does not seem likely, however, that their hopes will be realized, and if the roads really want to abolish scalping in Illinois they will now have a good chance to try. If they will only stand together of course they can do it.

The German Railroad Union every four years offers prizes to the aggregate amount of 30,000 marks (\$7,200) for important railroad inventions and improvements. The announcement of these, to be awarded to such as are submitted during the first half of 1895, offers a first prize of \$1,700, a second of \$720, and a third of \$360 for improvements affecting construction and mechanical apparatus regarding the road; similar prizes for improvements in rolling stock and its maintenance; and, for improvements in administration, operation and railroad statistics, a first prize of \$720 and two prizes of \$360 each. The authorities offering prizes suggest certain matters in which the need of improvements is specially felt, though the prizes are not limited to these. The matters suggested are: Improvements in the construction of locomotive boilers, especially such as, with no material increase in weight, make them safer from explosion, save fuel, prevent sparks, or reduce cost of maintenance. A durable hose-coupling for conducting steam, water and air on trains. An apparatus by which cars may be coupled by automatic American couplers and by the Union coupling now in use, without danger. A practical and cheap brake for freight cars in making up trains, [track brake?] Automatic protection of track against misplacement of switch while train is passing. A simple apparatus to show that the rear car of a train has passed a switch. Weighing apparatus by which each car of a whole train while moving, or loosely coupled, may be weighed with sufficient accuracy. A plan for the simplification of the accounts for the use of cars interchanged or hired. The improvements must be such as have been introduced within the eight years previous to July 15, 1895, and each must be in use on some Union railroad which supports the application for a prize. The prizes are to be awarded by a committee of 12 members appointed by the Union.

A railroad man recently appeared in Washington, D. C., who, since being discharged on account of dull times at East St. Louis, thirteen months ago, has traveled 50,000 miles in search of a job, and the Washington Star takes up a column to tell where he went and how hard a time he had in finding something to do. In fact he has not found anything yet, except that a sympathetic fellow-craftsman in Memphis lay off 15 days so as to give the tramp a chance to earn a suit of clothes and a pair of shoes. The itinerary followed was from St. Louis to Cincinnati, Columbus, Toledo, St. Louis, Fort Worth, San Antonio, El Paso, San Francisco, Ogden, Chicago; then through Indiana and Michigan to the Northern Peninsula, thence to Milwaukee, Minneapolis, Portland, Or., San Francisco, New Orleans, Vicksburg, Memphis, Little Rock, St. Louis; and then, since Jan. 1, "every city of any importance between the Mississippi river and the Atlantic ocean." Every division headquarters was visited, but the story was everywhere the same: large numbers of men had been discharged and stood waiting to take the first vacancy. This traveler seems to have ridden on passenger trains most of the way, conductors being generally lenient and superintendents often granting passes. It is not said what his occupation was, but probably he was a freight brakeman—or a newspaper story-teller. Evidently he is a typical Coxeyite. Like the journeys of certain female reporters around the world, this trip and all the useful information obtained from it could just as well have been secured by the expenditure of a few postage stamps.

The litigation which has involved the Philadelphia Elevated railroad projects ever since the companies were organized, has been decided adversely to their claims, by the Supreme Court of Pennsylvania in a decision announced this week. The Quaker City Elevated and the Northeastern Elevated, the companies affected by the Court's order, were organized under the general railroad act of 1868, and claimed that the amendment of 1887 to that act gave authority to build the roads as elevated structures. The Supreme Court decides that the charters under which they have been organized give no such power to build an elevated road through city streets. The opinion being by the highest court in the state, is, therefore, final, as the interpretation of the present railroad laws of that state. It gives a careful history of railroad corporation laws in Pennsylvania, and reaches the conclusion that they contain no provision for the incorporation of elevated street passenger railroads, and thus all possibility of the construc-

tion of elevated roads in Philadelphia, for a long time at least, is gone. Large sums of money have already been spent on the short sections of the line that were erected before the injunction suits were commenced. An act of Legislature authorizing the companies to carry out their projects must now be sought, but the experience that the promoters had in a previous attempt to secure desired legislation when they met strenuous and successful opposition by the surface street car lines, is likely to be repeated.

People who have hoped to see the freight and passenger agencies of competing railroads consolidated, as a means of economy and to soften the asperities of competition, will be discouraged at the action of the two principal roads in the "Associated Railroads of Virginia and the Carolinas" in establishing separate offices in the four principal Northern cities, where they have for many years dwelt together in unity. The only reason given is that "competition was so strong as to cause embarrassment in the operation of joint agencies." That, however, is a very good and sufficient reason. There is at present only one way for a lion and a lamb to lie down together; and, so far as concerns the present question, we may say that the same rule applies in the case of two lions. The only real progress in consolidation of agencies that has yet been made has been where, as in the Vanderbilt system, there has been actual consolidation of interests. We do not know as anyone outside of Wall street has really comforted himself, to any appreciable extent, with the hope that the general railroad situation, either east or west of Chicago, was likely to be improved any by the establishment of joint agencies, but this news item deserves to be chronicled for the benefit of that class. When Jay Gould announced, in 1890, that he was going to straighten up things generally, and that this scheme was to be one of his instruments for performing the operation, those who depended upon him for railroad information were supplied with a "point" which did great service; but since Mr. Gould died they have gradually grown sick at heart. Only those newsmongers who are very hard up for copy now try to get any encouragement out of the joint agency scheme.

The important improvement in Brockton, Mass., described in the *Railroad Gazette* of April 13—the abolition of 17 grade crossings, four-tracking the main line of the Old Colony railroad and the construction of new freight and passenger stations—has struck a snag, in the shape of a remonstrance against building one of the new stations 760 ft. south of the old one which it takes the place of. The remonstrants challenge the right of the special Commission, appointed under the grade-crossing law of 1890 to plan the improvement, to do any act not specified in the statute, and they ask the Superior Court not to confirm the report of the Commission. This remonstrance was to have been expected; for never in the memory of man has a passenger station been moved more than three paces without a controversy. Moreover, the Commission has, very likely, exceeded its powers if it has approved the change in location of the passenger station. But the illegality is only technical, for the Commission is charged with the duty of recommending changes in location of streets where necessary, and even abolishing them; and as stations are generally located on a street, the question now at issue would seem to be naturally included with those already placed by law within the authority of special crossing commissions.

We print on another page some notes of recent performances of the Baldwin four-cylinder compound locomotive "Columbia." While the tests here reported were not conducted with a view to making precise comparisons, they are of interest to all railroad men because the engine is one of the most powerful passenger locomotives ever built, and the service in which it was here tried was very hard. The steam pressure in the boiler of the Columbia was 190 lbs. per sq. in., 25 lbs. more than on the Baltimore & Ohio engines, with which comparison was made, and the driving wheels are 6 in. larger in diameter. The run of April 22, with nine cars, three more than the normal load, may probably be taken as showing something like the limit of this engine's power, as the train on that day was 24 minutes late in starting and kept late all the way. The running time was maintained, however.

The annual report of the Ministry of Railroads, etc., of Belgium, has been issued, showing the results of operation of the 3,249 kilometers of government railroads of that country. These railroads have cost 421,000 francs per kilometer, say \$135,000 a mile, which, considering the easy country through which they are built, is not precisely cheap. Total receipts from traffic have declined somewhat, that is, to 135% million francs, a falling off of 2% million from the preceding year. The percentage of operating expenses to gross earnings has remained pretty nearly stationary for some years, at about 53 or 54.

#### NEW PUBLICATIONS.

*The Year Book of the Engineering Society of the School of Mines, Columbia College, 1893-94.* E. H. Messiter, Editor. New York, 1894. 8vo., 86 pages.

This publication contains selected papers read before the Engineering Society of the School of Mines during the school year 1893-94, and includes the following: The New Croton Aqueduct, by E. H. Messiter; The Physiological Effects of Compressed Air, by C. D. Searle; Description of the Topographic Work of the U. S. Geological Survey, by G. F. Sherman; Reports of Committees on the Bethlehem

Iron Works; The Cantilever Bridge, by W. F. Smith; The Poetsch Freezing Method as Applied to Excavation in Quicksand, by L. H. Barnett; A Few Forms of Cut-off Apparatus Seen at the World's Fair, by W. Y. Westervelt; Bridge Repairs, by W. B. Parsons, C. E.; The Preparation of Anthracite Coal for the Market, by H. K. Masters; Analysis of the Cost of Different Systems of Street Car Propulsion, by M. Osterberg; The Hackensack River Bridge, Pennsylvania Railroad, by H. Pinkham; The Storage and Distributing Reservoirs of the Brooklyn Water Works, by C. P. Peugnet, and Deflections of Track Under Moving Trains, by E. H. Messiter. The Society is in a flourishing condition and has 44 active members, 21 honorary members and 272 associate members. The papers have been prepared for the Society by students members of the School of Mines. The 44 active members belong to the classes of '94 and '95. The papers are short but good, and some of them well illustrated.

## **TRADE CATALOGUES.**

*Illustrations of Standard Apparatus for Interlocking and Block Signaling.* National Switch & Signal Company, 32 Liberty street, New York; The Monadnock, Chicago.

The National Switch & Signal Company, which is now thoroughly reorganized, with re-enforced capital, skill and energy, and enters the field equipped for all sorts of signaling, issues a preliminary catalogue. The apparatus shown is none of it entirely new, we believe; most of it, in fact, is in considerable use on railroads. The interlocking machine we have described more than once. The locking is of the mitre type, but the tappets not only hang in vertical planes but are attached to both ends of the rocker. This makes the machine very compact and often adds greatly to the accessibility of the locking, not only for repairs but for rearrangement as new combinations are made. Another peculiar feature is the use of the Pfeil anti-friction locking for special locking. The National double-wire compensator, Mitchell & Stevens patent, is another of the specialties shown. This we described with illustrations when it was first brought out. Dwarf semaphore signals with one and two arms are shown, also the adjustable clamp pipe-lug, by which attachments can be made without cutting the pipe, the National (Palmer) torpedo signal, the Raub switch and signal stand and other minor devices. The Lattig automatic block signal is shown by several very good plates. This is a semaphore actuated by a motor on the post. The system is arranged on the normal danger principle and power to work the signal is supplied by a battery placed near the signal. An ordinary track circuit is used with low-tension, gravity battery, which, by the usual track relay, completes the circuit of the local battery so as to give a clear signal provided the block ahead is clear. The batteries are worked on the open circuit principle. The system may be used with a closed circuit and with the signal standing normally at danger, but the company does not recommend this practice. A system of controlled manual block signals is also illustrated. One of the minor devices shown is the anti-friction pipe carrier, in which the upper roller moves longitudinally, as well as the lower one. This was designed and patented by Mr. Evans, an English signal engineer, and is in large use in England; in fact it has become standard on several of the more important railroads there. Of course when one thinks of it, it is pretty nearly as important that the upper roller should move easily as that the lower should, for whenever the pipes are acting in compression they are as likely to bear against the upper roller as against the lower. This improvement adds much to the ease of working lines of pipe connection. Another detail of this pipe carrier is that it is so designed that it can be nested to carry as many pipes as may be desired; that is, instead of having stocks of carriers for one-way, five-way, 15-way, or whatever may be required one, pattern answers for all, the nest being built up in the field.

TECHNICAL.

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**Manufacturing and Business.**

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The Portland Company, of Portland, Me., is building a new side wheel steamer for the Portland Steam Packet Company for its line running between Portland and Boston. The new boat will be named the Bay State, and will be of the same general design as the steamer Portland of the same line. She will have a beam surface, condensing engine with cylinders 6x21½ inches. This Company is putting in a new shaft and making other extensive repairs on the steamer State of Maine of the International Line.

Mr. Edward F. Luce has been appointed General Agent of the Detroit Lubricator Company, and the Chicago office removed from the Western Union Building to No. 941 The Rookery.

The E. W. Bliss Company has lately moved its Chicago office and warerooms from No. 14 North Canal street to No. 100 West Washington street (near Desplaines street), where a representative line of presses, drop hammers, shears and sheet metal machinery will be kept in stock. The Chicago office is still in charge of Mr. C. W. Ellsworth, formerly superintendent of The Chicago Stamping Company.

The McLaughlin Automatic Safety Switch Co., of Chicago, has been incorporated by Josiah C. McLaughlin, G. N. Griffin, Thomas Bairstow, John C. Carlin, Charles P. Mattocks, and W. R. Mason.

The Youngstown Bridge Co. is building four spans of bridge work for the Richmond & Danville Railroad, and

has also been awarded the contract for the State Exposition Buildings at Springfield, Ill., and the new Lyceum Theatre at Memphis, Tenn.

## **Iron and Steel.**

The Bellaire Nail Works Co., at Bellaire, O., has contracted for the erection of a new blast furnace with a capacity of 200 tons daily, and also for the remodelling of its Bessemer steel plant.

### New Stations and Shops.

The station at Frankford, near Philadelphia, on the new Frankford branch of the Philadelphia & Reading, is to be three stories high and 64 ft. long. The building will be of brick with brown stone trimmings and tile roof, and is of a handsome design.

posts need not be set closer than 16 ft. to turn hogs, and 20 to 24 ft. for other kinds of stock. It will be observed that there are no barbs to injure stock, and that a whole panel is an integral, elastic structure which doubtless would be very discouraging to any stock getting against it. Users of the fence speak highly of it.

### **Electricity for an Elevated Road.**

The management of the Metropolitan West Side Elevated Railroad Company have decided to use electricity as a motive power in the operation of the road, the equipment to be somewhat similar to that of the Intramural Railroad at the World's Fair last year. Current will be taken from a third rail as on that road, and the motors will be mounted on the axles of the cars instead of on an independent locomotive. Beyond this, little has been settled upon as to the details of construction. Mr. W. E. Baker, who held the position of General Manager of the Intramural will have charge of the Electric Equipment.

## An Electric Rack Railroad.

Last summer the Bauer Mountain road was opened to traffic, and it is the first of its kind combining the rack system with electricity as motive power. The length of the road is 1,630 metres; total rise 170 metres; average grade 1 in 10; the steepest being 1 in 5.4; the shortest radius is 150 metres. Under the circumstances nothing but a cable road or a rack road could be considered. Originally a cable system was proposed, to be operated by hydraulic power, as used first on the Giesback road; this was, however, abandoned, and the rack system, operated by electricity, was decided on. The road is double track with a gauge of one metre. The rack lies in the center of track, and is laid as on the rails, on iron ties one metre apart. Special devices for fastening the rails and the rack to the ties, prevent their creeping; and every thirtieth or fortieth tie is securely anchored to piles deeply driven. The rails are 9 metres long, with joints supported; and the rack is made in lengths of three metres and has suspended joints. The current is delivered through overhead wires, and returns through the rails, which are connected by copper wires at the joints. It has a tension of 500 volts. At present only passenger cars are used, taking the current at two connections on top of the cars. They are arranged with 28 seats, and standing room for six or eight passengers; are 8 metres long, 2.45 metres wide and built in four compartments with access from the sides to the two middle ones and from the ends to the outer sections. Each car is provided with two pinions and with two independent dynamos of 36 horse-power. The dynamos are geared with the pinions which again engage the rack. There is a brake to each wheel, operated by hand from either platform. Beside this, an automatic brake under the car is actuated as soon as the speed becomes greater than 3.2 metres per second, when a centrifugal regulator releases a spring acting upon the brake. The current and motor can also be reversed by a simple device. At the end stations there is a mechanism for transferring the cars from one track to another; it adjusts itself automatically and is operated by electricity. Two Siemens & Halske ring dynamos, internal pole, of 500 volts, each coupled to condensing engine of 200 to 250 horse-power, furnish the current; steam being supplied from three boilers, one of which is held in reserve.

## **THE SCRAP HEAP.**

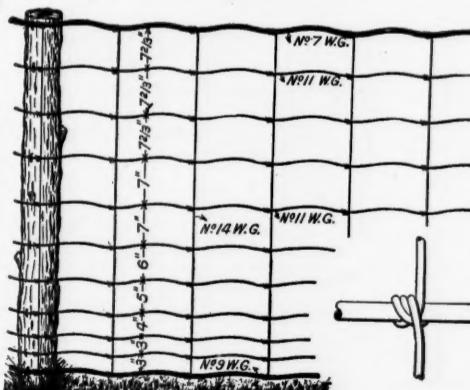
## Notes.

The United States authorities have not dropped the proceedings which were begun against certain employees of the Great Northern during the strike for interfering with the mail trains, and it is said that the General Manager of the road has refused to take back every employee that has been accused of injuring the company's property or delaying the mails, until an investigation can be made. The petition asking for a mandamus directing the managers of the Great Northern Railway to operate its lines in Montana as it had been accustomed to prior to the strike, was denied by the Supreme Court of the State. The reasons, according to telegraphic report, were: The Court held that the proceeding was equivalent to asking the Court to inquire and determine what would be a reasonable scale of wages for the men required to operate the road, and then ascertain whether the requisite number of men could be employed at the wages determined. The Court said it was not certain that it had jurisdiction for the arbitration of these questions or power to enforce its decision should it decide them. Furthermore, the Court is not sure that it has jurisdiction to issue such writ by reason of the relation of railroad property to interstate jurisdiction.

Jurisdiction.  
It is reported from Pullman, Ill., that the local unions of the American Railway Union have demanded a restoration of wages in the shops of the Pullman Palace Car Co. Why this Union should be interested in the wages of men in a contract car shop is not very clear.

The shops of the Marietta & North Georgia, at Marietta, Ga., were burned on the night of May 1. Five engines and several passenger cars were badly damaged.

It is reported that the shops and roundhouse of the Ohio River Railroad at Central City, W. Va., were destroyed in a thunder and wind storm on May 6. On April 29, a severe rain and wind storm did much damage in Texas. Three bridges were washed away on the Austin & Northwestern Railroad. The Texas & Pacific was damaged near Fort Worth. The Texas Midland had several bridges carried away. Traffic on the Houston & Texas Central between Waco and Corsicana was interrupted two or three days, and



that the horizontal wires are bent before being woven into the fence. The purpose of the vertical wires is, of course, to keep all the horizontal wires in the same relative position and to permit the use of fewer posts than would be necessary were these vertical wires not used. The corrugation of the horizontal wires is done by coiling the wires around a  $\frac{3}{8}$  in. rod in the process of weaving. The corrugation makes the fence elastic and provides within itself for variation of length due to contraction and expansion, or, as the makers express it, "there is always the same tension on the horizontal wires, which slack up at 30 degrees below zero as cheerfully as they take a new grip for 90 in the shade." Owing to the elasticity of the fence,

the St. Louis Southwestern was badly damaged between Purdon and Dawson.

Mr. Ramsey, Chief of the Railroad Telegraphers' Brotherhood, has been tried on a criminal charge for tampering with the wires of the Burlington, Cedar Rapids & Northern Railroad at the time of the strike last year, and acquitted.

Governor Flower, of New York, has approved the law authorizing the State Railroad Commission to award a \$50,000 prize offered by the Metropolitan Traction Co. for the best method of propelling street surface railroad cars.

The announcement of a new 24-hour train between New York and Chicago over the New York Central and the Lake Shore, which we printed last week, is now supplemented by the announcement that the North Shore Limited will be run through in 25 hours each way, a little faster than at present.

Mr. George Griffith, representing a London newspaper, passed through New York City this week on a trip around the world, in which he is attempting to beat the time made by Miss Bisland and others. He left London, March 12, and traveled via Paris, Rome, Naples, the Suez Canal and the usual route thence eastward. He came over the Canadian Pacific and sailed from New York for Southampton on Tuesday morning. He expects to reach London, in 64 days from the time he started. Nellie Bly took 74 days for her trip, and Miss Bisland 76; and it is said that George Francis Train went around the world in 68 days. The Legislative report favoring the construction of an elevated railroad on the Meigs system, in the streets Boston, has aroused a good deal of discussion in that city, and the Mayor has sent a message to the City Council characterizing the report as an audacious scheme to enable the promoters of the Meigs system to loot the State Treasury, to steal the streets of Boston, and to swindle the investing public. The *Journal* and the *Herald* speak in the same strain. The proposed law makes no restriction on the watering of stock, requires no payment by the company to the city, and calls for a subsidy of \$10,000,000 from the State.

The sixth annual convention of State Railroad Commissioners was begun in Washington on Tuesday of this week, about 40 gentlemen being present. Press despatches state that the Committee on Pooling made a report favoring the repeal of Section 5 of the Interstate Commerce Law.

The organized tramps continue to hang around the railroads in hopes of getting rides, but the reporters are giving them much less attention. It was reported last week from Des Moines, Ia., that the Rock Island road agreed to carry Kelly's gang to the Mississippi River, but afterward, the offer was withdrawn, and a proposal made to carry half of the crowd, provided the Chicago, Milwaukee & St. Paul would carry the other half. At last accounts the men were making rafts on which to float themselves to St. Louis or somewhere else down stream, a large quantity of lumber having been given to them. On May 2 a gang of 250 tried to cross the Eads Bridge, at St. Louis, and had to be stopped by the police because they had no money with which to pay toll. On May 3 a crowd of 200 men swarmed upon a freight train of the Northern Pacific, near Orting, Wash., and United States marshals had to be called out to drive them off. On May 3 a company of 219 men rode from Wheeling to Pittsburgh, their fares having been paid by Wheeling labor organizations.

On Monday last attorneys for the employees of the East Tennessee & Virginia & Georgia filed in the United States circuit court at Knoxville, Tenn., a bill restraining the receivers of the road from reducing salaries ten per cent., as was announced for May 1. Judge Taft, at Cincinnati, had refused to grant such an order.

#### Traffic of the St. Mary's Falls and Suez Canals.

During 1893, 3,341 vessels, measuring 7,659,068 net registered tons, passed through the Suez Canal, and 12,008 vessels measuring 9,849,754 net registered tons passed through the locks at the "Soo."

The St. Mary's Falls Canal was opened in 1855 with a traffic of 106,296 tons, which had grown to 690,826 tons in 1870, the first full year of traffic on the Suez Canal, which had 430,609 tons that year, but in 1872, 1,160,743 registered tons passed through the Suez, and 914,735 through the "Soo." The traffic on both these canals was given in our issue of March 4, 1887, for each year since their opening. Since 1886 the number of vessels and tonnage passing the two canals has been as below:

Year.	St. Mary's Falls Canal.		Suez Canal.	
	No. of Vessels.	Net Registered Tons.	No. of Vessels.	Net Registered Tons.
1887 . . . . .	9,355	4,897,598	3,137	5,903,024
1888 . . . . .	7,803	5,130,659	3,440	6,640,834
1889 . . . . .	9,579	7,221,935	3,425	6,783,187
1890 . . . . .	10,557	8,454,435	3,389	6,890,014
1891 . . . . .	10,191	8,400,685	4,207	8,698,777
1892 . . . . .	12,580	10,647,203	3,559	7,712,028
1893 . . . . .	12,008	9,849,754	3,341	7,659,068

It will be noticed that for four out of the five years ending with 1893, the traffic through the "Soo" has been greater than through the Suez; in fact the aggregate for the five years has been over 18 per cent. greater, although the "Soo" Canal has been opened but about seven months of each year.

The value of freight transportation has been much smaller on the "Soo" than on the Suez. Superintendent Wheeler, of the St. Mary's Falls Canal, says that the value of about one-half the freight at its port of delivery is not equal to the probable cost of transportation by railroad to the same point.

#### Currents in the Great Lakes.

In making up a wreck chart of the Great Lakes in the winter of 1891-2 in the United States Weather Bureau, it

was observed that wrecks were clustered in certain localities, thus suggesting the idea that unknown currents might play a considerable part in their distribution. In order to decide what these currents are, a large number of bottles were made with the name of the bureau blown in the glass, and given to lake captains, together with blanks on which the time and place of throwing the bottles overboard could be noted. The bottles contained instructions to the finder and franked envelopes in which to forward to the bureau headquarters the time and place of picking up the bottles. From the results of the investigation of the past two years a series of charts has lately been published showing what is now known of the lake currents. These currents are grouped as follows:

1. All of these lakes have an outflow, and there is a slow and general set of the water toward the outlet.

2. The prevailing winds produce a surface current, and as these winds are westerly, they cause, in the case of Lakes Superior, Erie and Ontario, lying nearly east and west, a surface current down the length of the lakes to the outlets. As Lakes Michigan and Huron lie approximately north and south, or across the direction of the wind, the surface drift is from the west across the lakes.

3. Then the outlets of the lakes are comparatively small, and as all the water driven toward them cannot pass through, return currents are noticeable for some distance back, and they combine with the direct currents in the wider lakes, Superior and Huron, to make a large general whirl of the surface waters. The same phenomenon is observed in Lake Michigan, which lies across the wind.

4. The smallest cause of motion is the surf, which, as soon as it breaks, carries along anything that happens to be floating in it. To this motion is due the tendency of the bottles to pass into the deep bays and lodge on the shores near their bottom.

It has also been noticed that barometric changes have some influence on the level of the lakes. A high pressure over the south end of Lake Michigan will, by its weight, lower the surface of the water under it and raise the level at the other end, thus causing for a time a movement of water from south to north.

#### South American Notes.

The Alagoas Railway, Brazil, reports an increase in the receipts for 1893 of 27% per cent. over 1892, with an increase of working expenses of 25% per cent. The result of the year's working is a deficit of about \$4,000, ascribed by the company to the depreciation of Brazilian currency.

The Brazilian government has invited tenders for a railroad 40 miles in length to connect the Conde d'Eu with the Natal and Nova Cruz line, being practically a continuation of the latter road from Nova Cruz to Independencia.

The taste for luxurious passenger equipment seems to be increasing in Argentine. It is now reported that the Central Argentine Railway has decided to out-do all its rivals by putting on four elegantly fitted passenger trains daily. The track is also being reballasted, and is to be laid with heavier rails. The increase of wheat raising is so great that the freight service of this line is inadequate to meet the demand, and new freight cars are to be ordered in time for next season's crop.

The Antofagasta & Bolivia Railway has been authorized to increase all traffic rates 25 per cent. owing to the fall in exchange, the new rates to continue in force until exchange rises above 36 cents. The interest on the bonds of this company, and a minimum dividend of 6 per cent. on its common stock, are guaranteed by the Huanchaca of Bolivia Silver Mines Co., Ltd., in addition to which the Chilean and Bolivian governments have guaranteed 9 per cent. on the capital invested. The income of the road so nearly meets all operating expenses and fixed charges, that the Huanchaca Silver Mines Co. has only been obliged to advance \$25,000 a year on account of its guarantee, and the indications are that the traffic receipts will soon cover all expenses and pay 6 per cent. on the stock.

#### An Incident in Indiana.

A search warrant has been issued for a freight car, supposed to be located somewhere on the Vandalia railroad, and believed to contain a load of stolen merchandise. Night before last a store at Cutler, Ind., was broken into and literally stripped of all its contents. The next morning a freight car, which had been left standing on a side track the night before, was mysteriously missing, and no trace could be gained of its disappearance. Cutler is at the top of a hill which slopes for miles in both directions, and it is supposed that the stock of the plundered store was first placed in the car, which was afterward pushed out upon the main track and allowed to coast down to one of the neighboring villages. There it is thought to have been falsely billed to some distant point and sent out on one of the early morning trains. A detective, armed with a search warrant, is now searching for the stolen property.—*St. Louis Republic*.

#### The Harwich and Hook of Holland Service.

The reader will remember that last year the Great Eastern Railway (England) opened a new service to the Continent by way of Harwich and the Hook of Holland. The traffic has increased very satisfactorily, and the company has recently put on a new steamer, The Berlin, and another one, The Amsterdam, will be put in service very soon. Beginning with the first of May it was the intention to despatch the Continental express train from the Liverpool street station at 8.30 in the evening, giving half an hour longer in town than heretofore and arriving on the other side at the same time. The new steamer registers 1,745 tons, and makes 19 knots.

#### The Speed of the Campania.

The record of a year's service of the Campania is published, voyage by voyage, in *Engineering* of April 27. It appears that the mean speed attained in nine round trips was 20.3 knots. The mean speed of the Lucania in six round trips was 20.4 knots. This is from April 23 of one year to March 30 of the next, but includes no time whatever between December 1 and March 11 for the Campania, and between December 15 and February 25 for the Lucania, during which weeks both ships were laid up. So these ships escaped some of the roughest weather of the year. Three years ago the same journal published detailed returns of performances of six competitive Trans-Atlantic lines, and the highest mean speed was about 19.1 knots. The Campania and Lucania have doubtless made a better average record for speed than any of the other Trans-Atlantic liners for the same length of time.

#### The Fast Runs from Florida.

We printed last week the report, as found in the newspapers, of a run from Jacksonville, Fla., to Jersey City, N. J., at the rate of 40.9 miles an hour. We have received no confirmation of the report that a train subsequently made the trip in 22 hours, and therefore conclude that it was unfounded. A correspondent on the Florida, Central & Peninsular has sent us some details of the runs. Special trains were run by both of the competing lines on April 6, April 11 and April 26, to carry the hotel help from Florida hotels to New York and the northern mountain and seaside resorts. On the first day the time made was made almost exactly the same on both routes. On

April 11 the Atlantic Coast line train ran from Jacksonville to Jersey City in 25 hours and 50 minutes. The Florida Short Line train made a very fast run as far as Greensboro, N. C., but north of that point was badly delayed by hot boxes. On the third race, the one reported in our last issue, the Savannah, Florida & Western (A. C. L.) started out with five cars, the engine being No. 14, which was built by the Baldwin Works, and was exhibited at the World's Fair. The other train had seven cars, and was drawn by a wood-burning engine, with 16 in. cylinders. At Savannah one of the cars was dropped, only three minutes being consumed in doing this and changing engines. This train ran to Columbia, 282 miles, in 6 hours and 29 minutes, equal to 43.4 miles an hour. This train stopped 19 minutes in Washington and the other one stopped there 50 minutes.

#### Elevated Railroads in Chicago.

The Northwestern Elevated Railroad has filed plans with the Commissioner of Public Works of Chicago, and applied for a permit to begin building. It is understood that the construction will be similar to that on the "Alley" though it is claimed for it that it will be stronger, lighter and more sightly. The company claims to have purchased enough of its right of way to warrant the belief that all will be secured and it proposes to begin construction at once. The route as laid out provides for a bridge across the river between La Salle and Wells streets. Vesselmen are protesting against the erection of any more bridges at this point, and the War Department may refuse to give the company permission to build a bridge, in which case the railroad company will have to change its plans or cross the river by one of the existing bridges, which the ordinance permits it to do. The company proposes to build a two-track structure south of the river, and a four-track structure north of the river, the two inner tracks to be used by express trains to the city limits and the outside tracks for local business. It is the intention of the company to tunnel some of the downtown buildings, the structure to be so arranged as to rest on its own foundation, entirely independent of the building, leaving spaces on each side of the tracks for small structures or booths. It is thought possible that the company can arrange for an easement through some of these buildings, in consideration of establishing a station in these.

#### An American Line Mortgage.

The International Navigation Co. has filed a mortgage for \$6,000,000 made in favor of the Fidelity Trust & Safe Deposit Co., of Philadelphia. The mortgage covers the entire fleet of what is known as the American Line, including the two ships now building at Cramp's. It covers also the entire fleet of the Red Star Line, and the four ships sailing in the Philadelphia-Antwerp service. The leasehold interest in the new pier at the foot of Fulton street is also covered. The annual meeting of the shareholders of the company was held on the 8th, the old Board of Directors being reelected, also C. A. Griscom, President, W. H. Barnes, First Vice-President, and James A. Wright, Jr., Second Vice-President.

#### New Hamburg-American Ships.

The Hamburg-American Company has now five steamers building especially for freight, but with accommodation for cabin and steerage passengers. Two of them are building in the yards of Harland & Wolff, Belfast, two in the yards of the Vulcan Ship Building Co. in Stettin, and the other by Blohm & Voss, in Hamburg. These ships are to be 460 ft. long, 52 ft. beam, 35 ft. depth of hold, with twin screws. They will have accommodation for 50 cabin passengers, and will have especially good accommodation for the steerage passengers in the way of a saloon and dining-room, separate state rooms for small groups of passengers, bath rooms, etc. Large refrigerating rooms are provided, and the carrying capacity will be about 8,000 tons. The ships are calculated for an average of 13 knots.

#### A Long List of Unpatented Inventions.

The management of the Pennsylvania Railroad claims the credit of being the pioneer in the following achievements: Introduction of vestibule trains, the introduction of stenographers, electric lights, baths, barbers, libraries, ladies' maids and movable easy chairs; the introduction in the United States of interlocking switches and the block signalsystem, the introduction of the method whereby engines can be supplied with water while running, the establishment of a personally conducted tourist system for the benefit of the pleasure-seeking public, the introduction of chaperons in connection with personally conducted tours and excursions, for the benefit of ladies traveling without escort, and the introduction of the system of elevated stations and double-decked ferry-boats.—New York Times.

#### British Shipbuilding in the First Quarter of 1894.

It appears that there were at the end of March, 1894, not including warships, 414 vessels under construction in the United Kingdom, the gross tonnage aggregating 725,208 tons. The steam tonnage amounted to 663,396, and the sailing tonnage to 61,812. As compared with the same quarter last year, there is an increase of about 128,000 tons in the steam tonnage and a decrease of 25,000 tons in the sailing tonnage, the net increase being 103,000 tons. The steam tonnage under construction is the largest since March, 1892, the sailing tonnage the smallest since September, 1888. Returns of vessels "preparing," that is, ordered but not begun, exceed those of the previous quarter by 95,000 tons, and are, especially of steamers, exceptionally high. In fact it is said that it is the largest steam tonnage reported as preparing for building since Dec. 31, 1889. The bulk of the increased work in hand as compared with last year is divided between the Clyde, the Tyne and the Wear.

#### The "Monorail" in France.

The Minister of Public Works will probably visit the Loire to preside at the inauguration of the "monorail" railroad from Feurs to Panissiere. This type of railroad was invented by the French engineer Lartigue. It worked for several years with success in Ireland, between Listowel and Ballybunion, 17 kilometers, where it carried freight and passengers regularly and safely. It is not without interest to observe that the first line of one elevated rail was introduced in the department of the Loire where was built the first French railroad with two rails.—Journal des Transports.

#### LOCOMOTIVE BUILDING.

The order received by the Rogers Locomotive Works from Cuba was for 12 locomotives, and not for seven, as reported in our issue of last week. The order includes five 8-wheel consolidation freight locomotives with 20x24 in. cylinders, five 8-wheel passenger locomotives and two switching engines.

The Baldwin Locomotive Works are building for the Buffalo & Susquehanna road at Pennsylvania two large consolidation engines and two 51-ton passenger engines. The present equipment of the line consists of a Brooks passenger and a Baldwin passenger engine.

## CAR BUILDING.

The Georgia Railroad has asked several car building firms to bid on the construction of 500 coal and box cars.

## BRIDGE BUILDING.

**Ashtabula, O.**—A bill has been introduced in the Legislature authorizing the city to sell \$30,000 worth of bonds for the purpose of building a bridge over Ashtabula River in this city.

**Annapolis, Md.**—Bridges over the Patapsco River destroyed by the heavy storm of May 6, will have to be replaced with new structures. They were located at Hood's Mills, Sykesville, Gorsuch, Henrytown. Two new county bridges at Grays will also have to be built.

**Baltimore, Md.**—Mayor Latrobe has signed the resolution appropriating \$27,000 for the construction of a bridge on Columbia avenue, over Gwynns Falls.

The First Branch ordinance for the construction of an iron foot-bridge across Jones' Falls and the Northern Central tracks, at the foot of Lafayette avenue, has been referred to the Ways and Means Committee of Select Council. That body has recommended to the Committee on Bridges the ordinance granting the Commissioners of Baltimore County and Wyatt Owen permission to connect a free bridge over the Patapsco River with Light street bridge. A protest against the bridge was submitted by the South Baltimore Business Men's Association.

**Casselman, Ont.**—Mr. E. A. Johnston, Clerk of Preston and Russell Counties, will present a report at the next meeting of the County Council on the reconstruction of the bridge at this place, recently swept away.

**Cleveland, O.**—A bill has been introduced in the Legislature to authorize the Commissioners of this (Cuyahoga) county to sell \$150,000 in bonds for the purpose of building a bridge over Rocky River at Mastick Hills or Stranahan Road.

**Columbus, O.**—The contract for the construction of the Commerce street bridge at Lockbourne, this county, was awarded to the Wrought Iron Bridge Co., of Canton, O., at its bid of \$99, and the Brown bridge contract went to the same company at its bid of \$854.

**Groton, N. Y.**—A new bridge will be erected by the Lehigh Valley about one mile south of here, to take the place of the one burned recently on the Auburn division.

**Harrisburg, Pa.**—A committee has again been appointed by councils to confer with the Pennsylvania, Philadelphia & Reading companies on the subject of an overhead bridge at Market street. This project has been before the city for years.

**Hopewell, Pa.**—A bridge will be constructed over the Raystown Branch of the Juniata, near Cyphen, to take the place of the 190-ft. structure destroyed by the storm of April 28.

**Meaford, Ont.**—Mr. J. Badgerow invites tenders for the construction of a steel bridge over the Big Head River, in accordance with plans prepared by the Central Bridge & Engineering Company, of Peterboro, Ont.

**Milton, Pa.**—The county will erect a new swing bridge over the canal at Center street, at a cost of \$1,100.

**Moorefield, W. Va.**—Robert A. Wilson, Clerk of the County Commissioners of Hardy County, W. Va., will receive bids at Moorefield, until May 25, for building a highway bridge 122 ft. in length, and for stone abutments 14 ft. wide and containing about 300 perches of stone, on Lost River, in Hardy County, W. Va., three miles above Harper's.

**Muskegon County, O.**—A bill has been passed by the House of Representatives which authorizes the County Commissioners of this county to issue \$7,000 in bonds for the purpose of raising funds to build a bridge at Taylorsville.

**New York.**—The New York and New Jersey bridge bill as amended to meet the objections to the bill vetoed by the President, passed the House of Representatives May 7.

**Ottawa, Ont.**—Mr. J. H. Balderson, Secretary Department of Railways and Canals, invites tenders until April 14, for the construction of a steel bridge, composed of one span 187 ft., and a fixed span of 22 ft., to carry the Canada Atlantic Railroad over the Sault Ste. Marie Canal and public highways. Plans can be seen at the office of the Chief Engineer of Railways and Canals, Ottawa.

**Philadelphia.**—A bill has been introduced in the New Jersey Senate by Senator Stokes giving the Pennsylvania & New Jersey Railroad Company the right to construct a drawbridge over the Delaware River from Penseauken Creek to Frankford Creek, Philadelphia. The directors of this company are officers of the Pennsylvania Company.

Surveys have begun for a new bridge on Columbia avenue over Gwynn's Run, under the direction of Bridge Engineer F. H. Smith.

Engineer Smith will have the plans for a new bridge on Monroe street, at Fulton Station, ready to advertise for proposals in a few days.

**Pittsburg, Pa.**—The stockholders of the Sharpsburg & Lawrenceville Bridge Co. contemplate the erection of a \$200,000 iron structure to take the place of the one which now spans the Allegheny River at Etina, and voted, May 8, upon a proposed increase of the capital stock from \$79,000 to \$200,000, the money to be used in erecting a new bridge.

**Providence, R. I.**—The new terminal facilities for the New York, New Haven & Hartford Railroad at Providence, R. I., will necessitate two large bridges which will be furnished by the Berlin Iron Bridge Co., of East Berlin, Conn. These bridges will carry 16 tracks over Gaspee street, Promenade street and Woonaquucket River. The bridges will be plate girders resting on abutments at the street line and columns at the curb line. There will be no floor beams or stringers used, but in the place of these will be a metal floor, supporting ballast in which the ties and rails will be bedded. The work will require about 4,500 tons of open hearth steel material. The Berlin Co. is to be allowed six months in which to complete the work.

**Reading, Pa.**—Great pressure is being brought to bear upon the County Commissioners in favor of an iron bridge over the Schuylkill at the foot of Sixth street. The question of damages is the chief obstacle in the way.

**St. Thomas, Pa.**—The County has been asked to build a bridge over the Carcocheague River, on the line of Guilford and Hamilton townships.

**Winnipeg, Man.**—Tenders are being received by Mr. J. C. Sproule, Chairman Committee on Works for the construction of iron superstructure for the Maryland street bridge. Full information can be obtained from Mr. H. N. Ruttan, City Engineer.

## RAILROAD LAW--NOTES OF DECISIONS.

## Carriage of Goods and Injuries to Property.

The Supreme Court of Texas holds that the omission to give statutory signals at a railroad crossing renders a railroad company liable where injury to stock results.<sup>1</sup>

In Alabama the Supreme Court holds that possession of a bill of lading by one other than the consignee without indorsement does not justify the delivery of the consignment to such person.<sup>2</sup>

In Georgia the Supreme Court rules that the statute requiring railroads to keep safe highway crossings, requires them to provide, where needed, railings on approaches to bridges over a cut. The necessity in any case is a question for the jury, but it cannot be said, where plaintiff's mule, shying at some new planks in the bridge, backed the wagon off the approach, that the lack of railings was not the proximate cause of the injury.<sup>3</sup>

The Supreme Court of Georgia holds that where a bill of lading is silent as to the time within which delivery is to be made, the law presumes it is to be done in a reasonable time, and parol evidence is not admissible to negative this presumption by showing that a definite time was agreed upon either expressly or by implication.<sup>4</sup>

A Texas statute provides that common carriers are required, when they receive goods for transportation, to give to the shipper, when it is demanded, a bill of lading or memorandum in writing stating the quantity, character, order, and condition of the goods. The Supreme Court rules that an expense account furnished by the carrier to the shipper after the arrival of goods at their destination, showing the amount of freight charges due, is not a part of the bill of lading.<sup>5</sup>

In Wisconsin the Supreme Court holds that where a shipper of live stock enters into a contract with defendant's freight agent at about 4 or 5 o'clock in the afternoon for the shipment of the stock, and for its delivery to him at the point of destination, a few miles distant, on the same night, a casual statement to the shipper made by the conductor of the train a few minutes before it started, and after the stock had been loaded on the car, that he did not think that it would be unloaded that night, does not change the contract, nor impose on the shipper the duty of stopping the transportation; and he is entitled to damages for injuries suffered by the stock owing to its exposure over night to the inclement weather.<sup>6</sup>

In New York the sectionmen of defendant railroad company, in repairing a cattle guard, deposited on the side of the highway refuse timber, which frightened plaintiff's horses, thus causing personal injuries to plaintiff. The Supreme Court holds that the question whether it was reasonably necessary, in the regular course of their employment, for defendant's servants to thus deposit the timber by the roadside, was for the jury.<sup>7</sup>

## Injuries to Passengers, Employees and Strangers.

In Virginia the Supreme Court holds that where a passenger who has procured a ticket for himself and family is by the negligent mistake of one of the employees of the railroad directed into a car which is cut off and left standing when the train leaves, one of his children with him being sick at the time, he is entitled to compensatory, but not to punitive, damages.<sup>8</sup>

The Supreme Court of Colorado rules that the contributory negligence of a person injured while riding on the platform of a car does not preclude his recovery against the company, where the engineer knew of his danger, and could have prevented the accident.<sup>9</sup>

In Georgia in an action for injuries to plaintiff's daughter, 17 years of age, caused by jumping from a train while in motion, plaintiff alleged that she was ordered so to do by the conductor, who refused to stop the train at that point, for which she had bought a ticket. The Supreme Court rules that there could be no recovery, though the conductor did give such order, if the danger of obeying was so manifest that a person of her age, in the exercise of ordinary discretion, would not have done so.<sup>10</sup>

The Supreme Court of Maine decides that it is the duty of a railroad, in order to be assured that its line is in a reasonably safe condition, to make as frequent inspection of its roadbed and track as can be done consistently with the conduct of its business; and, under circumstances of more than ordinary peril, the company should inspect its line with more than ordinary promptitude, particularly those portions that are most liable to injury by storm or flood.<sup>11</sup>

In Texas the Supreme Court holds that for one to step behind and follow a freight train without listening or looking to discover if an engine was following, though he knew that engines did sometimes follow freight trains, was contributory negligence, preventing recovery for an injury from an engine following the train at a distance of 50 to 150 yards, and running at 5 to 15 miles an hour, and that, too, though the accident was at a crossing, and the engine failed to give any signal.<sup>12</sup>

In Mississippi the Supreme Court rules that in an action for failure to uncouple its cars so as not to obstruct a highway crossing for more than five minutes, as required by Code 1880, Section 1,449, plaintiff may recover from exposure to weather while awaiting an opportunity to cross defendant's track, though there were houses near by in which he could have obtained shelter.<sup>13</sup>

In Iowa plaintiff's decedent, in going to defendant's depot to take a train, was run over by a car being kicked into a side track, and killed. Decedent knew that he was approaching a track. He was warned that a train was approaching. The whistle was blown, and the bell rung. Decedent did not stop to look or listen. The Supreme Court rules that a verdict should have been directed for defendant.<sup>14</sup>

In the Federal Court it is held that a railroad is responsible to a switchman in its service, who is injured by the breaking of a defective coupling link, for the negligence of its car inspectors in failing to discover and remedy the defect in the link.<sup>15</sup>

In Tennessee the Supreme Court rules that the conductor of a freight train, whom, by the rules of the company, the engineer is bound to obey, and who is accountable for the conduct of the trainmen, is a vice-principal, and not a fellow-servant of a brakeman who is injured in a collision.<sup>16</sup>

In the Federal Court it is held that the neglect of a locomotive engine-driver to keep a proper lookout, and his consequent failure to avert a collision caused by the negligence of his employer's vice-principal, is not imputable as contributory negligence to the fireman of the same engine, who was injured in the collision.<sup>17</sup>

In the Federal Court a railroad yard was shown to consist of side tracks adjacent to some principal station, where such switching is done as is essential to the proper placing of cars for deposit or departure. All operation of the yard was under the direction of a yard-master. The several yard switching crews were each under the control of a foreman. A brakeman of one of the crews was injured by the negligence of his foreman, whereby the train ran over his foot. The court held that the

foreman and switchman were fellow-servants, and the railroad company was not liable for the foreman's negligence.<sup>18</sup>

<sup>1</sup>T. & N. O. v. Cunningham, 23 S. W. Rep. 332.

<sup>2</sup>L. & N. v. Barkhouse, 13 South Rep. 54.

<sup>3</sup>G. R. & B. Co. v. Mayo, 17 S. E. Rep. 1,000.

<sup>4</sup>Central R. & B. Co. v. Hasselkus, 17 S. E. Rep. 8,8.

<sup>5</sup>Schloss v. A. T. & S. F., 22 S. W. Rep. 1,014.

<sup>6</sup>Corbett v. C. St. P. M. & O., 56 N. W. Rep. 347.

<sup>7</sup>Tinker v. N. Y. & W. 24 N. Y. 977.

<sup>8</sup>N. & W. v. Lipscomb (Va.), 17 S. E. Rep. 809.

<sup>9</sup>Denver & B. P. v. Dwyer, 33 Pac. Rep. 815.

<sup>10</sup>East Tenn., V. & G. v. Hughes, 17 S. E. Rep. 949.

<sup>11</sup>Ibby v. M. C. R., 26 Atl. Rep. 943.

<sup>12</sup>T. & N. O. v. Hare, 23 S. W. Rep. 42.

<sup>13</sup>Ibby v. N. O. & T. V. Durkee, 13 South Rep. 697.

<sup>14</sup>Banning v. C. R. I. & P., 56 N. W. Rep. 277.

<sup>15</sup>Little Rock & M. v. Moseley, 56 Fed. Rep. 1,009.

<sup>16</sup>C. v. Spence, 23 S. W. Rep. 211.

<sup>17</sup>C. v. Spence, 57 Fed. Rep. 1,009.

<sup>18</sup>Harley v. L. & N., 57 Fed. Rep. 144.

## MEETINGS AND ANNOUNCEMENTS.

## Dividends.

Dividends on the capital stocks of railroad companies have been declared as follows:

Chicago & Alton, quarterly, 2 per cent. on the preferred

and common stock, payable June 1.

Pennsylvania, semi-annual, 2½ per cent., payable May 31.

## Stockholders' Meetings.

Meetings of the stockholders of railroad companies will be held as follows:

Burlington, Cedar Rapids & Northern, annual, Cedar

Rapids, Ia., May 22.

Chicago, St. Paul, Minneapolis & Omaha, annual, Hud-

son, Wis., June 9.

Duluth, South Shore & Atlantic, annual, Marquette,

Mich., June 7.

Minneapolis, St. Paul & Sault Ste. Marie, annual, Min-

neapolis, Minn., June 5.

Missouri, Kansas & Texas, annual, Parsons, Kan., May

16.

New York & Harlem, annual, New York City, May 15.

Omaha & St. Louis, annual, St. Louis, Mo., May 15.

Pittsburgh, Fort Wayne & Chicago, annual, Pittsburgh,

Pa., May 16.

St. Louis, Alton & Terre Haute, annual, St. Louis, Mo.,

June 4.

## Technical Meetings.

Meetings and conventions of railroad associations and technical societies will be held as follows:

The Master Car Builders' Association will hold its annual convention at Saratoga, N. Y., beginning June 12. The hotel headquarters will be at Congress Hall, H. S. Clements, Manager.

The Master Mechanics' Association will hold its annual convention at Saratoga, N. Y., beginning June 18.

The National Association of Local Freight Agents will hold its annual convention at Pittsburgh, Pa., June 12, 13, 14. The headquarters will be at the Monongahela

House.

The Association of American Railway Accounting Officers will hold its next annual meeting at Willard Hall, Washington, D. C., commencing May 30.

The International Association of Car Accountants will hold its annual convention at Old Point Comfort, Va., beginning June 19.

The Western Railway Club meets in the rooms of the Central Traffic Association, Monadnock Building, Chicago, on the third Tuesday in each month, at 2 p. m.

The New York Railroad Club meets at the rooms of the American Society of Mechanical Engineers, 12 West Thirty-first street, New York City, on the third Thursday in each month, at 8 p. m.

The New England Railroad Club meets at Wesleyan Hall, Bromfield street, Boston, Mass., on the second Wednesday of each month.

The Central Railway Club meets at the Hotel Iroquois, Buffalo, N. Y., on the fourth Wednesday of January, March, April, September and October.

The Southern and Southwestern Railway Club meets at the Kimball House, Atlanta, Ga., on the third Thursday in January, April, August and November.

The Northwestern Railroad Club meets at the Ryan Hotel, St. Paul, on the second Tuesday of each month, at 8 p. m.

The Northwestern Track and Bridge Association meets at the St. Paul Union Station on the Friday following the second Wednesday of March, June, September and December, at 2:30 p. m.

The American Society of Civil Engineers meets at the House of the Society, 127 East Twenty-third street, New York, on the first and third Wednesdays in each month, at 8 p. m. The annual convention will be held at the Cataract House, Niagara Falls, N. Y., beginning June 20.

The Western Society of Engineers meets on the first Wednesday in each month, at 8 p. m. The headquarters of the society are at 51 Lakeside Building, Chicago.

The Engineers' Club of Philadelphia meets at the House of the Club, 1122 Girard street, Philadelphia, on the first and third Saturdays of each month, at 8 p. m.

The Boston Society of Civil Engineers meets at Westleyan Hall, 36 Bromfield street, Boston, on the third Wednesday in each month, at 7:30 p. m.

The Engineers' Club of St. Louis meets in the Missouri Historical Society Building, corner Sixteenth street and Lucas place, St. Louis, on the first and third Wednesdays in each month.

The Engineering Association of the South meets on the second Thursday in each month, at 8 p. m. The Association headquarters are at The Cumberland Publishing House, Nashville, Tenn.

The Engineers' Society of Western Pennsylvania meets in the Carnegie Library Building, Allegheny, Pa., on the third Tuesday in each month, at 7:30 p. m.

The Technical Society of the Pacific coast meets at its rooms in the Academy of Sciences Building, 819 Market street, San Francisco, Cal., on the first Friday in each month, at 8 p. m.

The Association of Engineers of Virginia holds informal meetings on the third Wednesday of each month, from September to May, inclusive, at 710 Terry Building, Roanoke, at 8 p. m.

The Denver Society of Civil Engineers meets at 36 Jacobson Block, Denver, Col., on the second and fourth Tuesdays of each month except during July, August and December, when they are held on the second Tuesday only.

The Montana Society of Civil Engineers meets at Helena, Mont., on the third Saturday in each month, at 7:30 p. m.

The Engineers' Club of Minneapolis meets in the Public Library Building, Minneapolis, Minn., on the first Thursday day in each month.

The Canadian Society of Civil Engineers meets at its rooms, 112 Mansfield street, Montreal, P. Q., every alternate Thursday, at 8 p. m.

The Civil Engineers' Club of Cleveland meets in the Case Library Building, Cleveland, O., on the second Tuesday in each month, at 8 p. m. Semi-monthly meetings are held on the fourth Tuesday of each month.

The Engineers' Club of Cincinnati meets at the rooms of the Literary Club, No. 24 West Fourth street, Cincinnati, O., on the third Thursday in each month, at 7.30 p. m.

The Engineers' Club of Kansas City meets in Room 200, Baird Building, Kansas City, Mo., on the second Monday in each month.

The Engineers' and Architects' Club of Louisville meets in the Norton Building, Fourth avenue and Jefferson street, on the second Thursday in each month, at 8 p. m.

The Civil Engineers' Society of St. Paul meets on the first Monday of each month.

The Scandinavian Engineering Society of Chicago meets in Room 309, Title and Trust Building, 100 Washington street, on the third Thursday in each month.

The Foundrymen's Association meets at the Manufacturers' Club, Philadelphia, Pa., on the first Wednesday in each month.

#### Sixth International Congress on Navigation.

Last week we gave the programme of topics for discussion at the Sixth International Congress on International Navigation, to be held at The Hague. The Congress will be opened on Monday, July 23, 1894, at the Academie des Baux-Arts, and will continue for six days. Members of the Congress will be delegates from governments and delegations accredited from chambers of commerce, railroad and navigation companies, and other transportation associations, technical and scientific societies, and other interested persons. Two excursions are now announced to take place during the week of the Congress, one to Rotterdam and the other to Amsterdam. There will also be three other excursions held after adjournment of the Congress—one to the Harlem Mere, and to several places below sea level; one to the new mouth of the Meuse, and the third to the Zuiderzee, the Island of Urk, and the Province of Overijssel.

Membership in this Congress which carries with it the papers and discussions printed in either French, German or English, and the right to take part in the meetings and excursions, can be secured at a cost of \$5.00. Subscriptions may be sent to the Secretary of the American Society of Civil Engineers, 127 East 23d street, New York city.

#### The Engineers' Club of Philadelphia.

At the regular meeting of Saturday, May 5, the papers were "Rebuilding the Pennsylvania Railroad After the June Flood, 1889," lantern illustrations, by Joseph T. Richards, with "Illustrated Note on Quadricycle Peugeot," by A. E. Lehman.

At the meeting of April 21, a paper with the title "The First United States Pneumatic Postal System," was presented by the author, Mr. A. Falkenau, who stated that the year of trial of the first pneumatic system for postal service in the United States had just been completed and the extension of the system for commercial as well as postal service was contemplated. In London the tubes are  $2\frac{1}{4}$  and 3 in. lead pipes laid in cast-iron pipes for protection. The carriers used in  $2\frac{1}{4}$  tubes were but  $1\frac{1}{4}$  in. diameter, the remaining space being taken up by packing. Carriers are dispatched singly. First, vacuum alone was used; later, vacuum and compressed air. The tubes used in the continental cities in Europe are wrought iron, the Paris tubes being  $2\frac{1}{2}$  in. diameter. There the carriers are dispatched in trains of 6 to 10, propelled by a piston.

The two methods of laying pipes on the radial and polygonal systems were fully described. To give an idea of the extent to which this work is carried in Europe, it was stated that the London system has 42 stations, with a total length of 34 miles of tubes. Six engines of an aggregate of 216 horse power control the power plant. The Liverpool and Berlin systems were similarly described.

In 1892 the Pneumatic Transit Company of New Jersey contracted to install the Philadelphia plant. As the size of tube adopted and laid was  $6\frac{1}{2}$  in. diameter, entirely new problems presented themselves. The velocities adopted in all systems are about the same, being 30 miles an hour. The stored energy of a London carrier while at full velocity is only nine foot-pounds, while that of the Philadelphia carriers has been as high as 1,380 foot-pounds. The problems of dealing with this energy were thoroughly solved by Mr. B. C. Batchellor, the engineer of the company. Air cushions were introduced, the accumulated pressure in the cushion chamber being utilized at the same time to operate automatically the receiving apparatus. The distance from the main post office to the sub-station of Chestnut street is 2,928 feet. There being an outgoing and return tube, the total length is 5,856 feet. There has not been a single case of obstruction of the tubes since the plant was first put into operation.

Attention was called to the fact that, mechanically, pneumatic propulsion is not economical, about 90 per cent. of the work being wasted. It was pointed out, however, that commercially the value of pneumatic transmission was amply proven and that the larger size of pipe adopted here would permit a more remunerative class of business to be done. It is now proposed to extend the system to cover the greater part of the city.

#### Boston Society of Civil Engineers:

A regular meeting of the Boston Society of Civil Engineers was held at its rooms, 36 Bromfield street, Boston, on April 18, President William E. McClintock in the chair, 78 members and visitors present. Messrs. William T. Barnes and Sumner Hollingsworth, of Boston, and Mr. William F. Williams, of New Bedford, were elected members of the Society. The following by-law was adopted:—"Any member of any other Society in the Association of Engineering Societies, in good standing, may become a member of this Society, when duly elected as described in By-Law 7, without paying the entrance fee, and with a release from the annual dues for such period, not over one year, as he may show by certificate he has paid in advance in the Society from which he comes." The Committee on Weights and Measures submitted its annual report bringing to the attention of the Society the latest information on the subject.

Mr. William B. Fuller read the paper of the evening upon Street Grades and Intersections.

Mr. A. L. Plimpton, Chief Engineer of the West End Street Railway Co., then gave a very interesting account of the experience of that company in welding its tracks electrically. Mr. Plimpton illustrated his remarks by blackboard sketches and specimens of the rail joints as welded.

At the next meeting of the Society to be held on May 16, 1894, Mr. F. P. Stearns, Chief Engineer of the State Board of Health, will give a description of the proposed improvement of the Charles River, as recently recommended to the Legislature of Massachusetts.

Mr. F. C. Coffin will read a paper entitled "Experiments in Current joints for Pipe Sewers."

#### PERSONAL.

—Mr. J. N. Miller, General Superintendent of the Pecos Valley road, with headquarters at Eddy, N. M., has been appointed General Manager of the company.

—It is said that Prof. T. C. Mendenhall, Superintendent of the United States Coast and Geodetic Survey, has been offered the Presidency of the Ohio State University.

—Mr. C. S. Hayden, Division Superintendent of the Gulf, Colorado & Santa Fe., with headquarters at Temple, Tex., has resigned, the resignation to take effect May 31.

—Mr. J. B. Connors, formerly Superintendent of the Toledo, Ann Arbor & North Michigan road has been appointed Western Superintendent of the Postal Telegraph Cable Co., with headquarters at Denver, Col.

—Mr. G. L. Huggans, of Carthage, who was Superintendent of the Carthage & Adirondack railroad until its lease to the New York Central road, and who has latterly been Trainmaster for the division from Utica to Ogdensburg, has resigned, his resignation to take place June 1.

—Mr. W. B. Coffin, who has been Superintendent of the Jacksonville, Tampa & Key West, has been promoted to be General Superintendent of that road, which is a new office. Mr. Coffin was formerly Division Superintendent on the New York, Lake Erie & Western for more than 10 years, and was also Resident Engineer of the Susquehanna Division of the road.

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*Chicago Great Western.*—Tracy Lyon is the correct name of the new Master Mechanic of this company, with office at St. Paul, Minn. He succeeds W. T. Reed, whose title was Superintendent of Motive Power and Rolling Stock. C. E. Slayton has been appointed Division Master Mechanic, with office at Oelievein, Iowa.

*Cornwall & Lebanon.*—Allen D. Hoffer has been elected Secretary, vice Geo. D. Rice. Mr. Hoffer still retains his title of Treasurer.

*Delaware & Hudson Canal Co.*—The stockholders of the Company elected the ticket prepared by the majority of the Board of Managers at the annual meeting in New York, on May 8. This ticket was as follows: James Roosevelt, Robert M. Olyphant, William H. Tillinghast, Alfred Van Santvoord, James A. Roosevelt, Alexander E. Orr, Cornelius Vanderbilt, Chauncey M. Depew, John A. Stewart, James W. Alexander, James R. Taylor, Benjamin Brewster, and Horace G. Young. The last five are new managers, and take the places of Le Grand B. Cannon, B. H. Bristol, R. Suydam Grant, Johnston Livingston, and Samuel Spencer, the latter having declined a reelection. There was no organized opposition to the regular ticket, which received a vote of 224,118 shares.

*Des Moines, Northern & Western.*—J. N. Tittemore has been appointed General Freight and Passenger Agent, with headquarters at Des Moines. The duties of this office were formerly performed by L. M. Martin, who recently resigned as Vice-President and General Manager.

*Eel River & Eureka.*—The present officers of this company are: John M. Vance, President; William Carson, Vice-President; T. R. Lever, Secretary, and C. I. Rose, Superintendent, with headquarters at Eureka, Cal.

*Elk Mountain.*—At the annual meeting held in Denver, Colo., May 4, the following directors were elected: John H. Simpson, S. C. Fulton, John Knowles, Fred C. Kilham, W. E. Renshaw, P. R. Wright, C. Walter, C. F. Murray and Frank Wood.

*Florida Southern.*—William H. Tanny, formerly employed in the shops of the Lake Shore & Michigan Southern at Norwalk, O., has been appointed Master Mechanic of this road, with headquarters at Palatka, Fla.

*Fort Worth & Rio Grande.*—H. P. Johnston having resigned as Superintendent of Transportation, the duties of that office will be performed temporarily by J. D. Huddleston, Chief Dispatcher, with office at Fort Worth, Tex.

*Hutchinson & Southern.*—The office of Superintendent has been abolished. All reports and correspondence previously addressed to that office should be addressed to Byron Roberts, Receiver, at Hutchinson, Kan.

*Kansas City, Osceola & Southern.*—Isaac Powell has been appointed General Freight and Passenger Agent, with headquarters at Kansas City, Mo.

*Lehigh Valley.*—Theodore Voorhees, having resigned as General Manager, the office has been abolished. Officers heretofore reporting to the General Manager will hereafter report to Mr. Rollin H. Wilbur, General Superintendent, who will report to the Second Vice-President. Charles E. Webster, Acting Chief Engineer, has been appointed Chief Engineer, and will report to the Second Vice-President.

*Mexican Central.*—The annual meeting was held in Boston, Mass., on May 2. The only changes in the Board of Directors were the election of B. P. Cheney, Jr., to succeed Edmund W. Converse, deceased, and Charles A. Brown, of Mexico, to succeed E. H. Whorf, of the City of Mexico.

*Michigan Central.*—The annual meeting was held in Detroit, Mich., on May 3, and the following directors were elected: Cornelius Vanderbilt, W. K. Vanderbilt, Frederick W. Vanderbilt, Edwin D. Worcester, Samuel F. Barger and Chauncey M. Depew, New York; Frederick S. Winston, Chicago; Ashley Pond and Henry B. Ledyard, Detroit.

*New Orleans, Fort Jackson & Grand Island.*—The annual meeting was held in New Orleans, La., on May 1 and the following directors were elected: James Wilkinson, Thomas Pickles, George P. Anderson and A. Socola. The following officers were also elected: H. C. Warmoth, President; F. T. Howard, General Manager; Albert Baldwin, Treasurer, and J. L. Landry, Superintendent.

*Norfolk & Western.*—The annual meeting was held in Roanoke, Va., on May 2 and the following directors were elected: C. H. Clark, F. J. Kimball, J. I. Doran, R. S. Brock, S. A. Crozer, A. J. Dull, U. L. Boyce, W. H. Taylor, S. A. Davis, H. Whelen, Jr., H. F. West, H. M. Sill and W. B. Campbell. H. F. West, H. M. Sill and W. B. Campbell succeed Charles Hacker, of Philadelphia; William Vivian, of London, and Robert Fleming, of Dundee, Scotland. The old officers were re-elected.

*Northern Pacific.*—William H. Phipps, Land Commissioner of the Chicago & Northwestern, has been appointed Land Commissioner of this company in place of Charles B. Lamborn. His office is to be located at St. Paul, Minn.

*Pennsylvania & New Jersey.*—The Directors of this newly chartered line are Henry D. Welsh of Philadelphia, President; John P. Green, W. H. Barnes, George Wood, N. Parker Sharbridge, Charles E. Pugh, William A. Potten of Philadelphia. President Welsh holds 5,000 of the 6,000 shares.

*Phillips & Rangeley.*—The directors have organized as follows: President, A. B. Gilman; Vice-President, George M. Goodwin; Treasurer and General Passenger Agent, F. E. Timberlake; Superintendent, D. W. Davis; General Freight Agent and Clerk, Mason Parker.

*Pittsburg & Western.*—At the annual meeting held in Pittsburgh, Pa., May 7, the following directors were elected: Orland Smith and James Sloan, Jr., of Baltimore; Edward R. Bacon, New York; Henry W. Oliver, John W. Chalfant, A. M. Byers, C. L. Fitzhugh and John McCleave. Thomas M. King was elected President.

*Pontiac, Oxford & Northern.*—James Houston, General Superintendent, has resigned, and William C. Sanford has been appointed Acting General Superintendent. Mr. Sanford will continue to act as General Freight and Passenger Agent.

*Queen Anne.*—A meeting of the stockholders was held at Centerville, Pa., May 7, and a permanent organization was effected. The following directors were elected: John S. Gittings, W. H. Bosley, B. Palmer Keating, William Emory, W. B. Oliver, W. G. McCormick and Frank Ehlen. W. H. Bosey was elected President, John S. Gittings, Vice-President; W. W. Busted, Secretary, and Robert H. Smith, Treasurer.

*Seaboard Air Line.*—L. T. Myers, General Superintendent, having resigned, that office has been abolished. The office of General Manager has been separated from that of Vice-President and John H. Winder appointed General Manager of the Seaboard Air Line, with office at Atlanta, Ga., with charge of the operating department. Officers heretofore reporting to the General Superintendent, or to the Vice-President and General Manager, as General Manager, will report to the General Manager. The General Manager will report to the Vice-President.

*Seaboard Air Line.*—The Eastern joint agencies have been abolished and the passenger offices of the line will be located as follows: W. W. Tull, New England Agent, office at No. 211 Washington street, Boston; C. Ironmonger, Eastern Passenger Agent, No. 287 Broadway, New York; H. L. Elkins, Agent, No. 33 South Third street, Philadelphia; P. B. Thompson, Agent, No. 207 East German street, Baltimore. C. I. Malone has been appointed Eastern Freight Agent, with office at 287 Broadway, New York.

*Wilmington & Northern.*—The annual meeting was held in Birdsboro, Pa., on May 7, and the following directors were elected: George Brooke, D. Charles Huston, A. L. Foster, John S. Gerhard, L. Heber Smith and William S. Conner. The following officers were also elected: President, H. A. Dupont; Secretary, E. B. Shurter; Superintendent and Treasurer, A. G. McCausland; Chief Engineer, F. L. Hills; General Freight and Passenger Agent, Bowness Briggs.

#### RAILROAD CONSTRUCTION, Incorporations, Surveys, Etc.

*Burlington & Missouri River.*—Chief Engineer Weeks, of Lincoln, reports that the contractors now have about 500 teams at work north of Sheridan, Wy., although the work is only just started. This extension is to be built to Billings, Mont., to which the location was completed last year. Kilpatrick Bros. & Collins of Lincoln, Neb., will do all the construction work except the track laying, which is to be done by the company's own forces. The maximum grade on the extension will be at 66 ft. to the mile, and the maximum curvature be three degrees, although there are few above one degree. There are five iron bridges on the line, three of 154 ft., one of 110, and one of 132 ft.

*Caleasieu, Vernon & Shreveport.*—Engineers have begun resurveying this road, which is already graded and has about 15 miles of track laid west from Houston River. Work will at once commence on the east end, opposite Lake Charles, at West Lake. The road is to be completed to Shreveport later in the year. The stock is principally owned by the lumber firm of Lock, Moore & Co., of Lake Charles. It is narrow gauge and intended chiefly as a lumber road.

*Clearfield, Conemaugh & Western.*—The surveys now being made will be completed in a few days, when a report will be made by Chief Engineer Brugger. Some time in June one of the three routes will be decided upon, and contracts for the construction of the 60 or more miles of line let. Active operations will then be commenced, and the road pushed to an early completion. S. J. M. McCarrell, of Harrisburg, Pa., is President, and Samuel Brugger of Fleming, Chief Engineer.

*Dry Fork.*—The recent items in regard to the construction work on this railroad may be supplemented by the statement that about six miles of the track is now built from Hendricks, W. Va., and this work is now going on and making very fair progress. The road is to be about 30 miles long from Hendricks, following the Dry Fork River the entire distance. The officers expect to have the road ready for operation by September. The larger part of the distance has been graded. The office of the company is at 208 Girard Building, Philadelphia; Robert Whitman, of Philadelphia, is President, Martin Lane, Secretary and Treasurer, and J. W. Morse, Jr., is Engineer.

*Great Salt Lake & Hot Springs.*—President S. Bamberger, of Salt Lake City, who recently returned from a long visit to the East, has arranged to begin work immediately on the extension north of Bountiful, Utah. That town is about nine miles north of Salt Lake City, and is the present terminus of the operated road. The line has been graded for some eight miles further to Kaysville and this grade will require little repairing to make it ready for the tracklaying.

*Gulf & Interstate.*—President Stoddard of this company states that the grading of the road is progressing favorably, and that 22 miles is ready for the rails through Bolivar Peninsula from the point opposite Galveston where work was begun late in March. President E. Stoddard of Omaha, still remains in Galveston. President Stoddard is in the field completing arrangements for ties, and the rails are expected to commence arriving in the near future. Rolling stock for construction has been arranged for and will be on the ground as soon as the iron is received.

*Illinois Central.*—It has been announced at Cherokee, Ia., the Western Iowa headquarters of the Illinois Central, that this company has finished its survey from Onawa, Ia., to Omaha, and will build the line, about 50 miles, at once. This survey was made by the Nebraska Central two years ago. The line extends from Onawa to Council Bluffs and crosses the river via the new bridge of the East Omaha Bridge & Terminal Co. This gives the Illinois Central an entrance into the South Omaha packing houses.

*Kingfield & Dead River.*—McGregor Bros. of Rumford Falls, Me., have the contract to lay the rails and to complete the ballasting on the Kingfield & Dead River Road, which they graded last fall from Kingfield Station north to Jerusalem, Me. They have already begun work.

*Lumberton & Lumber River.*—The town of Lumberton, N. C., has voted a subscription of \$20,000 to the capital stock of this company, which has been organized to build a railroad from Lumberton to connect with the Atlantic Coast Line about 12 miles from the town of Lumberton. The organizers and officers of the company are local residents.

*Mahoning & State Line.*—Edward Wendt is in charge of the engineers now engaged in surveying for this five-mile line, which is to connect the Pittsburgh & Lake Erie between Lowellville and Struthers in Ohio and extends to the state line. It reaches rich limestone deposits. The road, although working in conjunction with the Pittsburgh & Lake Erie, is owned and will be operated by a separate company.

*Montreal & Ottawa.*—An agreement has been arrived at between the counties of Prescott and Russell and the Canadian Pacific Railroad Co., by which the company agrees to expend \$100,000 within eighteen months in extending the Montreal & Ottawa Railroad from Point Fortune, and a further sum of \$100,000 within two years and a half.

*Montreal & Ottawa.*—The Railway Committee of the Dominion Parliament has passed the bill extending the time for the completion of this road to five years. The proviso requiring the expenditure of \$100,000 within 18 months of date, and an additional \$100,000 has been incorporated. The road is a branch of the Canadian Pacific.

*Northern Central.*—The branch to Scott Colliery, leaves the main line of the Shamokin Division near Brady

Station, Pa., and extends up Quaker Run to the Scott Colliery, a distance of three miles. The grading for the road is being done and materials to build the track have been received. The contract for grading was let April 20, 1894, to Smith & Campion, of Mahanoy City, Pa., who have 13 men and 25 teams employed. About one-fifth of the grading is completed. The work is light and maximum grade 105.6 ft. to the mile.

*Pennsylvania & New York.*—A charter was granted at Harrisburg, Pa., May 4. The capital stock is \$300,000, the company reserving the right to increase it so as to provide for the cost of an elevated structure. The line will begin at a point on the connecting road near Franklin Avenue in the 25th ward, Philadelphia, and extend eastwardly and southeastwardly via Roxborough street, on across the Delaware River. The road will be elevated and about two miles long.

*Pennsylvania & West Virginia.*—The charters granted last week in Pennsylvania to the Brock's Mills & Altoona; Mann's Choice & Hyndmann and Somerset & Bedford, three 15-mile lines, cover practically what was the Pennsylvania & West Virginia, with a branch into Somerset county. It is understood that work is likely to be begun very shortly on that part of the old Pennsylvania & West Virginia which has been graded, and that it will be pushed to completion. George B. Orlady, of Huntingdon, Pa., is President of all three companies.

*Philadelphia & Delaware County.*—The Pennsylvania Railroad's new line will be placed in regular service within the next 30 days. Joseph U. Crawford, Engineer of Branch Lines, states that the branch is ready to be transferred to the operating department. The line is about 10 miles in length from Fernwood, Philadelphia, to Newtown Square.

*Rhinebeck & Rhinecliff.*—This company has been organized to build a road from Rhinecliff to Rhinebeck, Dutchess County, N. Y. The line will connect with the Hudson River Railroad at Rhinecliff. The length of the road is four miles. Ground has been broken, and a large gang of men for the last week have been blasting out rock at high elevations. Nearly the entire capital has been subscribed by local capitalists.

*St. Mary's & Southwestern.*—It is reported that this new line which was to connect Shawmut with the Pennsylvania at St. Mary's, Pa., will use the Erie tracks from Hyde's to Shawmut and Horton City. By so doing the construction of several miles of road will be avoided. The new road was completed from St. Mary's as far as Centerville during the winter, and work on the Brockwayville side is being pushed along rapidly. A. Kaul, of St. Mary's, is General Manager.

*Tallahassee & Coosa Valley.*—The officers of the Tallahassee Falls Mfg. Co. are among those chiefly interested in the organization of this new company to build a road to connect with the Western of Alabama, and the Savannah, Americus & Montgomery, near Montgomery, Ala. Col. Bradford Dunham, of Montgomery, has been selected to be Chief Engineer of the new line, and about 15 miles of the line is reported to have been surveyed up to the present time from a point on the Tallapoosa River, northeast of Montgomery.

*Texas Midland.*—President E. H. R. Green, of Terrell, writes that he is now ready to receive bids for the construction work on the first 20 miles of the proposed extension from Roberts, Tex., North. The bids for the work are to be received up to May 19 at Terrell, Tex. This extension has been several times referred to in these columns. Three surveys have been run for the line between Roberts and Paris, the distance being about 65 miles. President Green has asked the town of Greenville, about 15 miles north of Roberts, to subscribe \$25,000 in aid of this extension and to secure a free right of way for the line between Roberts and Greenville, promising to have the road in operation to Greenville by Sept. 1 if these provisions are accepted.

*Unadilla Valley.*—Geo. M. Rusling, of 115 Broadway, New York, who has the contract for building this line to New Berlin, N. Y., is arranging to resume the construction south of Edmeston. The line is now completed for seven miles south of Leonardsville, N. Y., to this point. The entire distance to New Berlin is 20 miles. The right of way has been secured, and about \$40,000 in local aid has been voted to the company. D. Culver, of 171 Broadway, New York, is the Chief Engineer of the company, and M. C. Davis is Engineer in charge at Leonardsville, N. Y. Recently some changes in the directors of the company, which include some prominent business men in New York, have been made. Frederick De Copet has been chosen Vice-President, and Wm. Thune, of New York, has been elected a director.

*Washington & Chesapeake Beach.*—The general contract for building this road between Washington and Chesapeake Beach, Md., 30 miles has been awarded to Coffin, Sullivan & Co., of 52 Broadway, New York, as already reported. The sub-contracts have been awarded as follows: Weed, Sullivan & Renzo, Landover, Md.; Philip F. Cogan, Westphalia, Md.; Dimavant, Copen & Miller, Michael Burke, Marlboro, Md.; Vanaken & Hays, with headquarters at Marlboro, Md.; Samuel R. Adams, Pindells, Md., and Calvin G. Parrish, Friendship, Md.

*Winnipeg & Hudson's Bay.*—A bill respecting the Winnipeg & Hudson's Bay Railroad, extending the time for the construction of the main line to the Maskwachewan River to December, 1896, and changing the Company's name to the Winnipeg & Great Northern Railway Co., has passed the Railway Committee of the Dominion Parliament.

*Wiscasset & Quebec.*—The town of Wiscasset (Me.), has voted \$7,000 in aid of this railroad, and Whitefield has voted \$2,000. These sums are in addition to the amounts assigned the towns named by the projectors in their propositions. Wiscasset's contribution to this enterprise is now \$50,000 and Whitefield's \$25,000. The subscriptions to the capital stock are fast being closed up and work will soon commence along the line. The construction contract has been awarded to Messrs. Rowe & Hall of Boston. The location has been approved in each county through which the road will run.

*New Roads.*—C. W. Coykendall, of Corsicana, is trying to interest the towns of Corsicana and Fairfield in a railroad projected by him to connect those towns. The road will be about 35 miles long. His proposition is that Corsicana subscribe for \$100,000 of the bonds, and that Fairfield subscribe for about \$10,000 and furnish right of way for about 20 miles from the town.

*New Roads.*—Frank C. Ross, of Tacoma, Wash., who has been at the head of several local railroads at Tacoma, is projecting a new enterprise, and has surveyors running lines for a railroad from Enumclaw, Wash., which is situated on the main line of the Northern Pacific, 34 miles east of Tacoma and four miles east of Buckley, for a dis-

tance of 20 miles in the direction of Natchez pass, which lies to the southeast of the town, between the Stampede tunnel and Mount Tacoma.

### GENERAL RAILROAD NEWS.

**Boston & Albany.**—The company reports its earnings for the quarter ending March 31:

	1894.	1893.	Inc. or Dec.
Gross earn.	\$2,026,570	\$2,311,609	D \$285,039
Oper. expen.	1,251,175	1,493,939	D 242,764
Net earn.	\$775,395	\$817,670	D \$42,275
Fixed Charges	184,227	153,317	I 30,910
Surplus	\$591,168	\$604,353	D \$73,185

**New York Central & Hudson River.**—The following table gives the earnings and expenses of this company for the three months and for the nine months ending March 31:

	1894.	1893.	Inc. or dec.
Three mos. to March 31.	1894.	1893.	Inc. or dec.
Miles operated.	2,395	2,096	299
Gross earn.	\$9,722,854	\$10,706,859	D \$984,005
Oper. expen.	6,276,392	7,325,358	D 1,048,966
Net earn.	\$3,446,462	\$3,381,501	I \$64,961
First charges.	2,527,462	2,556,115	D 28,653
Deficit	\$255,701	\$292,467	D \$36,766
Nine months to March 31:			
Gross earn.	\$33,762,613	\$34,972,740	D \$1,210,127
Oper. expen.	22,593,812	24,041,433	D 1,447,621
Net earn.	\$11,168,801	\$10,931,307	I \$237,494
	7,741,080	7,520,241	I 220,839
Dividend	\$3,427,721	\$3,411,066	I \$16,655
	3,410,408	3,353,561	I 56,847
Surplus	\$17,313	\$57,505	D \$40,192

**Chattanooga Southern.**—The United States Court at Chattanooga, Tenn., has allowed the Receiver of the Chattanooga Southern authority to build a branch from its main line to Round Mountain Furnace, in Alabama.

**Chicago, Milwaukee & St. Paul.**—The company has sold \$2,000,000 general mortgage 4 per cent. bonds to Kuhn, Loeb & Co., and Speyer & Co., of New York. Vice-President Frank Bond says that the bonds were sold to reimburse the company for outlays on account of new second track, real estate and improvements, and to retire maturing bonds. The bonds are part of the \$7,735,000 held in the treasury at the date of the last annual report.

**Columbus, Sandusky & Hocking.**—A mortgage of the property of this company amounting to \$10,000,000 was filed in Ohio last week with the Metropolitan Trust Co., of New York, as Trustee, the bonds to run for fifty years, and bear 5 per cent. interest. This railroad was formed in December, 1893, by the consolidation of the Columbus, Shawnee & Hocking, and the Lake Erie extension of that road, which was built under the name of the Sandusky & Columbus Short Line.

**Dallas & Fort Worth Rapid Transit.**—The property of the Dallas & Fort Worth Rapid Transit Terminal Co., was sold at Dallas, Tex., on May 1, to Henry C. Scott, trustee, of St. Louis, for \$90,000. Mr. Scott is the President of the St. Louis Trust Co., which recently secured possession of the line and also of the West Dallas road. A new corporation has been organized to manage the properties and improve the roadbed and rolling stock. The motive power is to be changed from steam to electricity.

**Delaware & Hudson Canal Co.**—The annual meeting was held in New York on May 7, the stockholders electing the directors named in another column. President Olyphant read the ordinance providing for an increase in the capital stock. It stated that on Oct. 1, 1894, \$4,289,000 of the outstanding bonds would mature, and that the managers had decided to take them up with stock issued at par, recommending that \$5,000,000 new stock be issued, making the amount outstanding \$35,000,000, rights to subscribe to the new stock to be given to the stockholders at par in the proportion of one share of the new to every six shares owned. The vote in favor of this issue of stock, and to elect the directors nominated by the proxy committee, was over 225,000 shares out of the 300,000 shares of outstanding stock.

**Dodge City, Montezuma & Trinidad.**—The Supreme Court of Kansas decided on May 5 the suit instituted by the people of Ford County for the purpose of preventing, if possible, the present owners of the Montezuma Railroad from tearing up the tracks and removing their property. The decision was in favor of the railroad, the court refusing to issue the writ of mandamus asked for, on the ground that no principle of law or justice would compel any corporation or individual to operate a railroad at a pecuniary loss. In this case parties from New York and Chicago proposed to build a road from Dodge City, Kan., to Trinidad, Col. The road was built from Dodge City to Montezuma, a distance of 28 miles, the aid voted along the route being almost enough to pay for the construction. The projectors failed to carry the scheme any further, and the road was operated as a branch of the Chicago, Rock Island & Pacific. Interest on the bonds defaulted, and the road was recently sold, but the order of sale failed to include the franchise or the right of way, and the purchaser, who was but the agent of one of the original promoters, claimed that he had acquired no rights under which he could operate the road. Then he undertook the removal of the property, but restraining orders were issued and the case reached the Supreme Court.

**Dominion Atlantic.**—The Railway Committee of Ottawa has passed the bill to authorize the purchase of the Yarmouth & Annapolis Railroad by the Windsor & Annapolis Co., and to change the name of the latter Company to the Dominion Atlantic Railway Company.

**New York & New England.**—The Reorganization Committee of the company has decided to offer par and interest for their bonds to such of the second mortgage bondholders as are indisposed to come into the reorganization scheme upon the terms offered them. Under the terms of the plan of reorganization, the second mortgage bondholders were offered 40 per cent. in cash and 60 per cent. in the 5 per cent. bonds of the proposed new company. Some of the second mortgage bondholders objected to the terms offered them, and formed a Protective Committee in Boston, of which Mr. F. L. Higginson was made Chairman. This Committee advises the deposit of bonds under the modified plan of reorganization.

**New York, Lake Erie & Western.**—The following table gives the earnings and expenses of this road for the month of March and for the six months of the fiscal year:

Month of March.	1894.	1893.	Decrease.
Gross earn.	\$1,991,648	\$2,644,650	\$653,002
Oper. expen.	1,447,249	1,710,995	263,746
	\$544,399	\$933,655	\$389,256
Due to leased lines.	183,577	215,096	31,519
Net earnings.	\$360,822	\$718,559	\$357,737

Month of March.	1894.	1893.	Decrease.
Gross earn.	\$12,593,395	\$14,820,866	\$2,227,471
Oper. expen.	9,080,457	9,967,897	\$887,460
	\$3,512,958	\$4,852,968	\$1,340,010
Due to leased lines.	1,153,430	1,314,191	D 160,761
Net earn.	\$2,359,528	\$3,538,777	\$1,179,249

**North Galveston, Houston & Kansas City.**—The foreclosure sale of the road took place at Galveston, Tex., on May 2, and the property was purchased by T. P. Nichols, of Galveston, for \$30,000. The sale was made by the Receiver, R. A. Reese, in conformity to the decree of the Texas State District Court. The road extends from Virginia Point to North Galveston and is about 18 miles long.

**Pennsylvania.**—The report of earnings on the Eastern lines for March, make the following comparisons:

MONTH OF MARCH.	1894.	1893.	Inc. or dec.
Gross earn.	\$4,912,362	\$6,095,891	D \$1,183,529
Operating expenses.	3,255,611	4,323,764	D 1,068,153
	\$1,656,751	\$1,772,097	D \$115,346
Net earn.	\$5,396,968	\$3,508,754	D \$111,786

The Western lines in March decreased \$683,000 in gross earnings, and \$17,000 in net earnings.

Net earnings in 1892 were \$1,644,275; in 1891, \$1,567,425.

Three months to March 3.

	1894.	1893.
Gross earn.	\$13,074,513	\$16,146,176
Oper. ex per.	9,677,545	12,67,422
Net earn.	\$5,396,968	\$3,508,754

The Western lines for three months show a gross decrease of \$1,643,402 and a net decrease of \$76,614. The net earnings of the system decreased in three months \$188,400.

Net earnings in 1892 were \$4,290,759; in 1891, \$4,323,614.

**Philadelphia & Reading.**—The Committee composed of Frederic P. Olcott, Adrian Iselin, Jr., J. Kennedy Tod, Henry Budge and Thomas Denny, has prepared an agreement under which it asks deposits of the general mortgage 4 per cent. bonds of the company. This committee announce that they will procure the payment in cash of interest upon the bonds, or in default thereof, provide for the foreclosure, if deemed advisable, of the mortgage. Should foreclosure become necessary, they are empowered to purchase the property and to submit a plan of reorganization, which shall be deemed binding if acceded to by two-thirds of the subscribers to the agreement.

**Savannah, Americus & Montgomery.**—The Bondholders' Committee of the Railroad have agreed upon a plan for their organization of the road and to take the property out of the receivers' hands. It is also decided to extend the road 75 miles into Savannah. A syndicate composed of New York, Baltimore and Richmond bankers recently formed, has subscribed over \$1,000,000 for these purposes. New securities are to be issued to the existing bondholders. The Bondholders' Committee includes John Gill, Frank S. Hambleton, John W. Middendorf and R. B. Sperry of Baltimore, John Skelton Williams of Richmond, and W. F. Cochran of New York.

**Waco & Northwestern.**—The petition of E. H. Green, of Terrell, Tex., President of the Texas Midland railroad, to be relieved of his purchase of this road at the foreclosure sale at Waco, Tex., on Dec. 28 last, was argued before the Special Master appointed by the United States Circuit Court, at Galveston, Tex., on April 26. Mr. Green alleges in his petition that he purchased the road under the impression that it was to include the land grant and other valuable property described in the advertisement, but actually not included in the property sold at the foreclosure sale.

### TRAFFIC.

#### Traffic Notes:

It is reported from Cincinnati that President Ingalls of the Chesapeake & Ohio, is going to Europe on May 30 to see about getting more steamships to run on the line between Newport News and European ports.

The Pennsylvania Railroad has been sued at New York for \$98,873, the value of several shipments of pig lead carried by the road in 1888, which were delivered without demanding the bill of lading, the goods thus being secured by parties not entitled to them.

The American Line has reduced the steerage passenger rate from all railroad stations in Great Britain to New York to \$18, of which \$4 is paid to the agents as commission. This is to meet the competition of the Continental Lines, which has recently begun taking passengers from Liverpool.

A conference is being held at San Francisco this week between the Presidents and other officials of the Southern Pacific and Atchison considering the points of difference regarding California passenger business, pursuant to agreement made prior to the recent restoration of rates.

The Pullman sleeping cars between New Orleans and Denver, which have hitherto run over the Texas & Pacific and the Union Pacific, are now running over the Chicago, Rock Island & Pacific. Interest on the bonds defaulted, and the road was recently sold, but the order of sale failed to include the franchise or the right of way, and the purchaser, who was but the agent of one of the original promoters, claimed that he had acquired no rights under which he could operate the road. Then he undertook the removal of the property, but restraining orders were issued and the case reached the Supreme Court.

**Chicago Traffic Matters.**—CHICAGO, May 9, 1894. The general managers of the East-bound lines at their meeting last week made quite substantial progress toward putting their new agreement into effect for handling East-bound freight. When the question of percentages was reached, however, the demands of some of the weaker lines were such as to require considerably more than 100 per cent. of traffic to go around, and after considerable discussion, in the course of which the differences were quite largely overcome, it was finally decided to leave the whole question of the apportionment of East-bound freight traffic in the hands of ex-Chairman Aldace F. Walker, as arbitrator, his decision to be final. A hearing has been announced for May 16. In the meantime the lines in interest will file their arguments and claims for allowances with the arbitrator. A resolution was then adopted pledging all lines to the maintenance of agreed East-bound rates pending such hearing and decision.

Subsequently the meeting took up for consideration East-bound passenger rates, but no conclusion was reached and an adjournment was taken until to-day. There appears to be quite decided objection to the much-talked-of \$10,000 penalty clause, and affirmative action upon it is unlikely. Moreover, it is alleged that some of the lines that are paying excessive commissions are unwilling to cancel contracts which they have in effect unless they are guaranteed

a much larger percentage of the business than the other lines are willing to concede.

The Chicago and Ohio River lines have agreed to reform, or rather form anew their association, primarily for the handling of passenger traffic, and have elected J. F. Tucker, formerly Assistant General Manager of the Chicago, Milwaukee & St. Paul, and later Vice-President of the Chicago, Fort Madison & Des Moines, as Commissioner. A meeting was held yesterday to agree upon by-laws for the Association and put on the finishing touches. The new agreement, it is understood, provides for an equal division of all Chicago-Ohio River passenger traffic. Later it is probable that the freight department of the Association will be resurrected. These lines have been some of the most troublesome of all the East-bound lines to keep in harmony, and if Commissioner Tucker succeeds in maintaining peace among them he will do well.

No progress has been made towards a settlement of the Western passenger situation, and the result of the conferences held here last week is not reassuring. The Wisconsin Central has now given notice of withdrawal from the Western Passenger Association, May 12, alleging that the agreement does not protect, and that the members are constantly violating it in secret, and refusing to openly make the rates which they privately sanction. With the Wisconsin Central, representing the Northern Pacific, Great Northern and Soo-Pacific terminals, and the Union Pacific and the Santa Fe outside the Association, it was soon seen that there was little hope of arriving at any settlement of the excursion and immigrant disturbances, and consequently a special committee, consisting of Messrs. Newman of the Northwestern, Eustis of the Burlington, and Chairman Caldwell was appointed to do missionary work and see if the Association could be reformed on lines that would be acceptable to the roads now outside, and try and induce them to come back to the fold. Until this committee makes a report no attempt will be made to further discuss the rate troubles, and each line will endeavor to act in a conservative manner and keep the Association from further disaster in its efforts.

The Central Traffic lines have notified their Western connections that inasmuch as they have declined to participate in arbitrations east of the Mississippi River, that the Eastern connections will demand full local rates. The matter is now being considered in both Associations, and it is probable that a joint meeting will soon be held at which a better understanding will be arrived at.

The annual disturbance in wool rates has made its appearance. The Kanawaha Despatch has reduced the agreed rate to 51 cents per 100 lbs., from the Mississippi River to New York, and 57 cents to Boston, via the Big Four and Newport News. Lake and rail rates are being quoted from Chicago to Boston on a basis of 42 cents, a cut of 16 cents in the agreed lake and rail rate. The all-rail rate is still 71 cents, and the Central Traffic lines have agreed not to meet the cuts, pending efforts to induce the offending lines to restore rates. If these efforts are unsuccessful, it is probable that the rates will have to be met. There are indications that some of the lines are secretly meeting the reduced rates, but it is believed that this is not being done to any considerable extent as yet.

The Michigan Central and the Great Eastern Fast Freight Line are the latest converts to the so-called common-law form of bill of lading. The form issued by the Michigan Central is radically different from other forms in that it not only contains no liability clause, but has a clause providing for delivery without presentation of the bill of lading unless goods are consigned "to order" or are otherwise specially consigned. The form includes a clause providing that a charge of \$1 per day may be made for detention of cars.

There is great demoralization in Colorado freight rates. Westbound rates have been openly reduced from two-thirds to one-half both to Colorado and to lower Missouri River points. The Burlington on Monday announced a tariff on fifth class from Chicago to Colorado Common points of 25 cents, the established rate being 75. On Tuesday the Atchison issued a tariff, effective May 11, reducing all class rates, Chicago to lower Missouri River points just one-half. The other lines will follow suit. This action is taken because, it is claimed, other lines have been secretly manipulating rates. The only hope of averting a war is that the severity of the cut may lead to a prompt restoration.

The Atchison to-day gave notice of withdrawal from the Western Freight Association, to take effect May 19. This road has already withdrawn from all other associations, and grave apprehensions are felt that all Western rates will now go to pieces. Several lines are preparing to cut eastbound, as well as westbound rates, from the Missouri River. The Alton and other lines will reduce rates on packing house products eastbound this week.

The Louisville & Nashville yesterday inaugurated a series of monthly excursions to nearly all southern points for fare one way for the round trip.

There was little activity on the lake last week. Charters were slow at 1½ cents a bushel for wheat, and 1¾ cents for oats, Chicago to Buffalo.

The National League of Commercial Travelers is again pressing the roads for an extra allowance of baggage up to 300 lbs., and a decrease in fares of about 25 per cent. They promise that, if these concessions are made, they will all be good boys and not fib about the weight of their baggage or deal with scalpers any more.

All rail shipments last week held up remarkably well and raise a suspicion that some of the lines are secretly procuring business which ordinarily would go to the Lake lines.

The shipments of East-bound freight, not including live stock, from Chicago, by all the lines for the week ending amounted to 55,779 tons against 57,289 tons during the preceding week, a decrease of 1,510 tons and against 52,536 tons for the corresponding week last year. The proportions carried by each road were:

Roads.	Wk to May 5.		Wk to April 28.	
	Tons.	P. c.	Tons.	P. c.
Michigan Central.....				